S·A·E JOURNAL

Published Monthly By The Society of Automotive Engineers, Inc.

C. W. Spicer, President — David Beecroft, Treasurer

John A. C. Warner, Secretary and General Manager

Norman G. Shidle, Executive Editor

Vol. 44 — JANUARY, 1939 — No. 1

CONTENTS

Light-Weight Passenger Cars for Railroad Service – *William H. Mussey* - - - - - 9

SAE Annual Meeting Program - - - - - 13

Engineering Display Exhibitors - - - - - 15

Applications Received - - - - - 16

New Members Qualified - - - - - 16

(Transactions Section Begins)

Harshness in the Automobile – *H. A. Hicks and G. H. Parker* - 1

Aircraft-Engine Lubrication – *E. L. Bass and C. H. Barton* - - 8

Rubber as a Load-Carrying Material – *F. L. Haushalter* - - - 15

Some Developments Relative to Crankcase-Oil Filtration – *A. T. McDonald* - - - - - 23

Tank Mileage – *W. E. Zierer and J. B. Macauley, Jr.* - - - 29

Improvements in Diesel-Engine Lubricating Oils – *Ulric B. Bray, C. C. Moore, Jr., and David R. Merrill* - - - - - 35

Tire Design Factors Influencing Control of Vibration – *E. S. Ewart* - - - - - 43

(Transactions Section Ends)

About SAE Members - - - - - 18

SAE Coming Events - - - - - 19

News of the Society - - - - - 20

Ralph Teetor Speeds World Congress Plans - - - - - 20

SAE Student Branches – *New York University* - - - - - 25

About Authors

● **C. H. Barton** *(FM '31) joined the Asiatic Petroleum Co., London, after being graduated from Cambridge University in 1922. Since then he has been concerned principally with chemical work on fuels and lubricants and with the testing of these products for performance in internal-combustion engines.*

● **E. L. Bass** *(FM '35) has been in charge of the technical side of Shell Aviation since 1932. Previously he was attached to Messrs. Ricardo's engine laboratories and engaged in the testing and development of fuels and lubricants. His office is in London.*

● **Ulric B. Bray** *(M '38) is best known for his work in lubricating oils. He pioneered the use of propane in lubricating oil refining and the development of various propane-solvent refining processes, including de-asphalting, dewaxing and solvent extraction. He has also been active in research directed toward the use of addition agents to supply deficiencies existing in well-refined hydrocarbon oils. Dr. Bray joined the Union Oil Co. of Calif. in 1928 and has been assistant manager of research since 1936. He received his B.S. degree from Emory University in 1921 and his Ph.D. from Yale in 1925. During the next two years he was at the California Institute of Technology on a National Research Council Fellowship. Before joining Union Oil he was associate research supervisor with the Atmospheric Nitrogen Corp. in 1927-1928. Dr. Bray is the Southern California Section's vice-chairman, fuels and lubricants, and holds the commission of lieutenant in the U. S. Naval Reserve, engineering, volunteer special service.*

● **E. S. Ewart** *has been associated with the automotive industry since 1911. Prior to the War he spent six years obtaining his education as mechanical engineer at the Detroit Technical Institute, spending three years of this time as design engineer on gasoline and steam-propeller automobiles. After two years in the War as highway engineer, he rejoined the automotive industry as design engineer on trucks and tractors. Two years later he joined the*

(Continued on page 17)

Publication Office, 56th and Chestnut Sts., Philadelphia, Pa.; Editorial and Advertising Departments at the headquarters of the Society, 29 West 39th St., New York, N. Y. Western Advertising Office, Room 2-136 General Motors Bldg., Detroit, Mich.

The Society is not responsible for statements or opinions advanced in papers or discussions at its meetings or in articles in the JOURNAL.

HERE IT IS ALMOST 1940!

THE fact that "Bendix exists because Bendix assists" is perfectly illustrated by a moment's reflection upon the cars of 1939, as we pause in the creation of our 1940 versions.

One notable, general improvement characterizes current cars: the old, familiar, gearshift lever is gone, leaving the floorboard free for foot room and knee room.

Bendix did that. Two lines of cars, built by forward-looking folks, pioneered this advancement which was created and developed by Bendix. They profited measurably by their foresightedness. Then, as you know, the industry almost unanimously turned to the principle.

Past seasons have followed singularly similar patterns. Bendix has been ready with better and better and better braking, carburetion and starting . . . through which you who design cars and trucks, as well as we, have profited.

At this moment (as at any given time) Bendix has fully developed for application to your new chassis layouts, many things that represent distinct advancements over current practice.

Bendix-Stromberg Carburetion, Bendix Brakes, Bendix-BK Power Braking, Bendix Advanced Gear Control and Bendix-Weiss Universal Joints offer constructive aid in your 1940 problems. A telephone call or wire will get action.

BENDIX PRODUCTS

DIVISION OF

BENDIX AVIATION CORPORATION

South Bend, Indiana

E.S.

Light-Weight Passenger Cars for Railroad Service

By William H. Mussey
Engineer of Research, Pullman-Standard Car Mfg. Co.

IN looking over the history of railroad development in this country, it is difficult to find any other four- or five-year period which has been more productive of new types of transportation vehicles for passenger train service than during the period from 1933 to the present time. It was on Feb. 6, 1934, that the first modern light-weight, streamlined train to be built in the United States was completed by the Pullman-Standard Car Mfg. Co., for the Union Pacific Railroad Co. It consisted of three cars. This train showed a marked departure from the so-called conventional trains which were then in operation. The purpose of the train was to provide safe, fast, comfortable, and cheap transportation so that some of the travel that was going to the highways could be reclaimed by the railroads and, because of its speed, to entice customers from the airplane.

In order to utilize the smallest possible amount of power for propulsion, the cross-section of the train was kept at a minimum. This factor, together with streamlining not only the front and rear ends but the train throughout, reduced the wind resistance to a minimum. Articulation served two purposes, namely, to cut down weight on account of fewer trucks, and to promote easy riding qualities by the elimination of couplings between the cars. The car structures, as well as the interior finish, were built almost entirely of aluminum, as well as were many of the appurtenances. This train did not just happen. Most of the features were new and required exhaustive study and experimentation in order to establish the fundamentals necessary to the successful achievement of the objects just mentioned and, furthermore, they were to be the foundation for future development of trains for this most promising field of transportation.

Since this first streamliner was put into operation it is rather amazing how rapidly the number of light-weight streamlined trains and light-weight cars has grown.

Response Gratifying

This rapid advancement has received its impetus from the response of the traveling public, which, in every case, has been very gratifying. It is difficult to obtain reservations on these new trains, and not at all unusual to find a waiting list for those desiring space. In some cases it is necessary to make application for sleeping-car reservations from four to six weeks in advance when contemplating departure date.

There are now in operation or on order for early delivery 72 light-weight trains comprised of 684 cars. In addition there are a large number of light-weight cars built for use either in solid trains or mixed with conventional cars, so that the total number of light-weight passenger-train cars built or on order at the present time is 1239 for Class I railroads operating in the United States.

Prior to 1933, car designs, although not standardized, did incorporate a good many standard practices and quite a number of features which were standard to a great many cars. However, streamlining, articulation, tight-lock couplers, improved draft gears, easy-riding trucks, improved air brakes, new types of vestibule closures, disappearing steps, head-end electric power, dehydrated windows, a new style of heating arrangement in combination with air-conditioning systems, which were also quite new – all required development and, in many cases, sample set-ups in the shops.

In addition to these features which might be called the necessities, the railroads operating these trains have sought the last word in convenience, comfort, and luxury. It has seemed that, as each new train has been produced, there was one dominant thought in mind – to surpass everything that has gone before. The fact that this policy has increased the cost by leaps and bounds has not deterred the railroads in their efforts to make each succeeding train the finest and most

SINCE 1934 when high-tensile low-alloy steel became available, approximately 900 main-line passenger cars have been constructed of it, and considerably more for traction lines, Mr. Mussey points out. This material has a yield point approximately twice as great as that of low-carbon steel such as is used in conventional cars, he explains, and is considerably cheaper than stainless steel or aluminum alloy.

Aluminum is the lightest of the three materials commonly used for passenger trains, he reports, with practically no difference in weight between stainless steel and high-tensile low-alloy steel.

Spotwelding and arc welding had to be developed to very high degree to produce light-weight passenger cars of stainless steel and high-tensile low-alloy steel.

[This paper was presented at the Metropolitan Section Meeting of the Society, New York, N. Y., Oct. 13, 1938.]

deluxe ever built. There must be a limit beyond which we should not go from an economic standpoint in designing the new cars, but we evidently have not yet reached that limit, as the present-day trend toward further embellishment is still upward and it is a question whether cars would not haul just as many passengers if they were treated with more simplicity. The railroads are in a position to know the answer to this question better than are we.

The first streamliner was hardly in operation before there was a demand for more cars per train and a reduction in time schedules. This demand has carried on until, at the present time, there are in operation trains having three coupled powerplant cars with a rated capacity of 5400 hp which haul an additional 14 cars. As trains increased in length, the part played by streamlining in reducing train resistance at high speeds became less and less even on level tangent track, due to the increase in skin friction caused by the longer trains and the increase in cross-sectional area which has been limited only by the railroads' equipment clearances.

"DURING the last 46 months as of date Sept. 12, 1938, the Pullman Co. has carried over 64,000,000 passengers nearly 32,000,000,000 miles, and these passengers spent 900,000,000 hr in Pullman cars, without the loss of a life."

Streamlining is still with us and will remain; it contributes toward lower train resistance, minimizes the dust whirl at high speeds, has eye appeal, and the public likes it.

The time lost in starting and in ascending grades, with other contributing factors of lesser importance, plays a most important part in elapsed time between terminals. The cry is for more and more speed and for one more car per train, as there are few of these trains which have enough capacity to meet the public demand. The outstanding answer to it all is light weight.

The transition from wood to steel passenger cars on steam railroads occurred very rapidly. Some few experimental or sample cars were built in 1906 and 1907. A considerable number were built in 1908 and, by 1910, practically all new passenger cars were being built of steel.

As was to be expected, the steel car was patterned after the existing wood cars to a large degree.

There was much apprehension that steel cars might have a relatively short life due to rapid corrosion; therefore, relatively thick members were used. Various arbitrary rules and empirical formulas were introduced, both on account of the fear of corrosion and to emphasize the strength and safety of the new steel structures.

It so happened that heavier and larger capacity steam locomotives were coming into the picture at that time, each year showing a trend upward. The maximum speeds, as we now consider them, were not great; trains were not, in most cases, of their present length; and no one seemed to consider weight except there was the general feeling that increased weight indicated greater safety and longer life for the equipment.

The next step was an increase in the number of cars per train, and the desire for more speed. The older, lighter, and less powerful locomotives became obsolete. The railroads were approaching a parallel to the present naval problem: thicker armor plate and then larger guns to penetrate thicker armor plate.

The study of electric traction pointed clearly to the effect of reduction of train and car weight and higher acceleration on time schedules, as it was reflected in the size of the motors and the demands on the powerplant, in the conductors for current transmission, and also in the power bills.

The railroads started to become weight-conscious, and the car builders became most active. Studies were made of airplane and automobile design and construction, as well as of railroad car structures and the materials available.

Railroads have set a high standard of passenger safety – of which there has not been and must never be any let down. The safety of the passenger must be insured to the highest possible degree under the most severe operating conditions, and that statement covers derailments, train collisions, and many other conditions that need not be enumerated.

To illustrate the feeling of security that the railroad passenger must feel, I mention the remarkable record of the Pullman Co. During the last 46 months as of date of Sept. 12, 1938, the Pullman Co. has carried over 64,000,000 passengers nearly 32,000,000,000 miles, and these passengers spent 900,000,000 hr in Pullman cars without the loss of a life. The railroads provide the safest form of transportation that is known today.

When one considers that a car at rest weighing 127,000 lb on the rails hit by a 160,700-lb car at approximately 12 mph, receives an impact through the coupler equivalent to 1,600,000 lb, it is startling to attempt to visualize the enormous forces that must be considered, taking into account the number of cars which go to make up a train, since the impact force delivered by one car is of such magnitude.

Performance Studied

The railroads, car builders, and their designers closely followed the performance of the first steel cars, and since that time there has been a continued and even more intense study up to and including the present time. What has happened to cars in collisions of any nature, when cars are derailed and roll over, when cars are side-swiped or even struck on the side by some exterior object? Has there been a failure due to the kind of material used? Have cars properly resisted telescoping by impacting cars or locomotives?

All stood ready to change design and construction to provide greater safety to the passenger. To the credit of all concerned I may say that, having followed the steel passenger car since its inception, the car that was built in 1910, if not retired due to obsolescence, would fulfill the requirements that I have brought out previously.

In 1912, the U. S. Post Office Department issued a specification designed to protect its employees in which are described apartment cars for Railway Mail Service, which carry mail clerks.

There have been several revisions of this specification to meet changing conditions, the last of which was issued this year.

The specification represents the joint efforts of the U. S. Post Office Department, Association of American Railroads, and the car builders. A car could not be placed in railway mail service unless it conformed to this specification.

In addition to a detailed description of the interior arrangement required for mail service, the specification outlines the minimum strength of the car structure as a whole and in detail.

To the credit of the railroads, in having cars built for their own use, they have conformed to this specification as to mini-

mum strength and, in most cases, they very materially have exceeded these requirements.

I believe that I have brought up to date and made clear the amazingly successful efforts of all concerned in producing cars of what by some have been called "the conventional type."

We now take up what may be called the advanced chapter, "light and safe passenger-car structures."

Inasmuch as we only have time to consider the saving in weight in the car structure, I believe that you should realize the limitations of weight-saving, taking only into account the shell, made up of underframe, sides, ends, and roofs.

The weight of the shell in the older conventional cars is approximately 55,000 lb In Cor-Ten steel the weight would be 25,000 lb, a saving of 54% in aluminum, the weight, 20,000 lb, a saving of 64%. The car with the 55,000-lb shell weighs 160,000 lb complete, including air conditioning. With Cor-Ten steel we have saved one-sixth and, with aluminum, one-fifth of the total car weight. Considerable progress has been made in further savings, a good many of which are largely in the hands of the railroads. I now mention specialties, trucks, interior finish including architectural design and furniture, but these items must be reduced further in weight if lighter cars are to be built. There is no basis for any belief that the car structure is susceptible to much further weight reduction – it has gone further than most of the other parts of the car. However, in these lighter cars built by Pullman-Standard Car Mfg. Co., there has been no sacrifice of safety. They still meet all of the requirements of the Railway Mail Service Specification.

Safe as "Conventional Cars"

In considering a light car structure we have demanded that it have the same factor of safety as "conventional cars." To make myself clear, the two types of cars may be, and are, operated in the same train; therefore, the light car must offer at least the same resistance to destructive forces as the "conventional car." A pound of material must do a pound of work as a component part of the structure, and it must do more than it did in the conventional car because it is of high-tensile material. A pound must be so combined with the other pounds so that each part does its full share of the work to be performed and is an integral part of a unitary structure.

The foregoing calls for the most careful study in the selection of materials to be used and in the design and construction of the framed unit.

When the first streamliner was being designed, the materials which were available to the car builder were aluminum alloys and stainless steel, ordinary low-carbon steel not being conducive to light-weight structures. Aluminum alloy was selling at approximately 35¢ per lb but, in buying a pound of aluminum, you obtain three times the amount in bulk that you receive when you buy a pound of steel. In designing the load-carrying members, it is necessary to increase the volume of metal used in these members over what would be required in steel in order to make them just as strong, but the resulting aluminum structure is substantially lighter. Stainless steel was costing approximately 40¢ per lb and, although its tensile strength is higher than that of aluminum alloy, the full value of this increased tensile strength could not be utilized in car structures because of the resulting thinness of many of the sections, making them incapable of withstanding compression stresses without buckling. In other words, more material actually would have to be used in those sections than stress calculations based on tensile strength alone would indicate, in order to keep down vibrations in the structure. It was determined by the builders of the first streamliner, therefore, that aluminum was more satisfactory than stainless steel from the standpoint of both weight and cost, and it is still true today that aluminum cars of equal strength can be built substantially lighter than either stainless steel or high-tensile low-alloy steel, the latter having become available since the first streamliners were designed, and that the aluminum cars are somewhat cheaper than the stainless-steel cars as well. It is an economic problem.

The steel manufacturers soon took notice of the requirements of the new light-weight cars and obtained from the car builders the physical characteristics necessary for moderate-priced high-tensile alloy steel and, after considerable experimentation, such steels became available early in 1934. The yield point, or the point at which steel begins to stretch rapidly, or permanently deform, is approximately twice as great in these new alloys as in low-carbon steel, such as is used in conventional cars. These factors involving the strength of this material seem perfectly satisfactory from a car-building standpoint as they afford all of the strength that can be utilized satisfactorily in car structures subjected to both compression and tensile stresses from operating over the track, and from longitudinal train shock due to buffing, without exhibiting vibration in the structure. To avoid vibration it is essential to have a sufficient mass of material in the structure, regardless of the tensile properties of the materials used.

This high-tensile low-alloy steel costs approximately 4¢ per lb so that, from the standpoint of cost and physical characteristics, it is quite attractive in making it possible to build a light-weight structure at moderate cost. Since the advent of this new high-tensile steel approximately 900 main-line passenger cars have been constructed of it, and considerably more for traction lines.

Although aluminum-alloy structures have all been assembled with rivets and although this construction is very satisfactory from an engineering standpoint since the sections have proper thickness, it became necessary to develop the art of welding the high-tensile low-alloy steel in order to obtain the lightest possible structures embodying its use. In other words, sections of steel entering into car structures can be considerably thinner if welded, since riveting requires a suitable bearing area between the rivets and the sheets and, in order to obtain a total bearing area of sufficient amount, the number of rivets required is excessive, which condition means very considerable loss in the net section of the sheet. Welding has other advantages, such as making the joints water-tight and, therefore, sealed against corrosion.

"AS trains increased in length, the part played by streamlining in reducing train resistance at high speeds became less and less even on level tangent track, due to the increased skin friction caused by the longer trains and the increase in cross-sectional area. . . ."

Corrosion, however, has never been a serious factor in passenger-car structures of ordinary carbon steel when properly designed and protected against corrosion, as our experience has shown that such cars have outlasted their useful life and that obsolescence has retired them rather than their physical condition. The three materials considered in this paper, namely, stainless steel, aluminum, and high-tensile

low-alloy steels, have greater resistance to corrosion in varying degrees than ordinary carbon steel, and all can be used satisfactorily in car structures from the standpoint of resisting corrosion if that property is to be stressed.

Today there are many trains built of each of the three materials – aluminum, stainless steel, and high-tensile low-alloy steels. The cost of them, when fabricated into car structures, should line up in the following order: stainless steel highest; aluminum second; and high-tensile low-alloy steel third, or cheapest. The weights are in the following order: aluminum lightest and, as between high-tensile low-alloy steel and stainless steel, when of equivalent strength, there is practically no difference, although there is a slight edge in favor of the high-tensile low-alloy steel because of its higher modulus of elasticity.

In order for the builders to produce trains of stainless steel and high-tensile low-alloy steel, it has been necessary to develop to a very high degree both spotwelding and arc-welding. Spotwelding is under the control of devices which regulate the time, pressure, and current to a very high degree of accuracy, thus eliminating the human element after the controls have been set properly. Arc-welding is done out in the open so that it is inspected easily for quality of workmanship. The welders, however, are trained carefully and have to pass a satisfactory test similar to the one required by Hartford Steam Boiler Inspection before they are accepted as qualified welders. It has been found, however, that it is easier to train men for welding jobs than it is to train them to do good riveting.

In the years since the first steel passenger cars were built, there has been a steady accumulation of information regarding the action of, and stresses in, car structures. These two factors make it possible for designers to proportion accurately each member for the work it must do, considering the material selected and the type of construction.

Causes of Stresses

A car frame is made up of many parts and must be scrutinized closely for excessive stresses and deflections, localized stresses, reversal of stresses, and vibratory stresses. These stresses are likely to be caused by static loading, live load or vertical impact, and longitudinal impact.

We have checked these light-weight cars, both as to parts and the completed structure, under the just-enumerated conditions, using extensometers and impact strain gages. In one of these tests we used 230 impact strain gages on a car shell. These gages were put in places which insured a most thorough investigation of all parts of the structure. They will record the magnitude and nature of tension, compressive and shear stresses, reversal of stresses, vibratory stresses and, if it exists, permanent set.

These tests have confirmed our designs and construction even under the most exacting conditions of loading and impact. It is interesting to point out some of the facts developed.

The longitudinal impact stresses, even at low speed, exceed those due to lading or live load or vertical impact.

The absence of any general bending or buckling, even under the most extreme longitudinal impact, is indicated. The stresses in many cases are lower than in the conventional cars which have such a fine record, even under most extreme conditions and, in all cases, they are lower in proportion to the yield points of the materials used in the two types of cars. The stresses in the superstructure are lower than in the underframe members.

The tests show that the side sills do not and cannot resist any considerable proportion of the total end load or force due to buff as compared to the center sill. The floor stringers cannot carry any appreciable amount of the total end load.

Tests have been made of structures which demonstrated the possibility of sudden failure by rupture in a car member, even though it possesses high ductility, when the rate of loading or stressing is extremely high. The possibility of failure in this manner – "cold-brittle" failure – cannot be determined from ductility, yield point, nor from the ultimate strength of the steel or other material.

The possibility of this type of failure occurring under high speeds or impact may be greatly reduced by: (1) providing a sufficient area of metal to carry the transfer of energy without high stress and (2) reducing the rate of transfer of energy by providing more time for the transfer.

The cars that we have designed, built, and tested have been entirely free from any indication of any such possibilities.

For the last 30 or 40 years at least, car building has been known as a mass-production industry. It was one of the original industries devoted to mass production. Orders for both freight and passenger cars used to come in large quantities of identical design, so that economical production methods could be followed. The shops are now equipped for mass production which promotes economy, but the full value of this equipment and of these economical production methods is not obtainable because of lack of standardization in railway equipment. We builders are in the hands of our customers in that respect. It was only last year that our passenger shop at Pullman was engaged in fabricating four entirely different types of structures for passenger-car bodies, as follows: riveted aluminum girder type; riveted high-tensile low-alloy steel girder type; welded high-tensile low-alloy steel girder type; and welded high-tensile low-alloy steel truss type.

This work was going on simultaneously and the amount of preparation necessary to get ready for these four different jobs can be imagined, to say nothing of the actual production of them, involving entirely different machines and different types of labor. It is to be expected that, during the development stages, standards cannot be made quickly without hampering progress. However, the present method is costly, and full advantage cannot be obtained from automatic equipment, nor from the skill of the operators who become more proficient when producing large quantities.

Questions are sometimes asked about the advantages and disadvantages of articulated cars. Articulation has been used largely to save weight but, in the earlier light-weight trains, it had an additional advantage of promoting better riding than was achieved with conventional equipment. Since that time, however, there have been improvements made in trucks, draft gears, and couplers, the Tite-Lock coupler having come to the front, so that today equally as good riding qualities can be obtained without resorting to articulation.

In this connection it might be of interest to note that the weight per passenger carried in articulated cars is approximately the same as the weight per passenger carried in non-articulated cars, the reason being that articulation requires shorter cars because the distance between truck centers is the same in both cars and we lose the benefit of the overhang for revenue-carrying space.

I have tried to acquaint you with the background of light-weight passenger cars placed and being placed in railroad service and the future problems.

You well know of the traveling comforts and luxuries that are yours when you travel on railroad trains and, evidently, the trains of tomorrow will offer even more.

In the space at my disposal I have tried briefly to acquaint you with the exhaustive study and research which has been, and is being, carried on so that you may travel more and more safely in light-weight cars at even increasing speeds on the railroads of this Country.

S·A·E Annual Meeting

JAN. 9-13
DETROIT

Book-Cadillac Hotel

- *National Defense Day*
- *20 Technical Sessions*
- *33 Topics*
- *World-Known Authorities*
- *Engineering Exhibit*

. . . AND the DINNER – Climaxing
National Defense Day
Wednesday – Jan. 11

FOR FULL DETAILS SEE PROGRAM ON FOLLOWING PAGES

SAE ANNUAL MEETING

PROGRAM OF EVENTS

Monday, Jan. 9

10:00 a.m. — **Aircraft Engine**

R. N. DuBois, Chairman

BMEP Parameter for Cruising Power Control – R. E. Johnson and W. G. Lundquist, Wright Aeronautical Corp.

A Non-Icing, Fully Maneuverable Aircraft Carburetor – M. J. Kittler, Holley Carburetor Co.

10:00 a.m. — **Transportation and Maintenance**

F. L. Faulkner, Chairman

Safety Lane Testing – J. F. Winchester and J. J. Powelson, Standard Oil Co. of N. J.

Compulsory Vehicle Inspection from the Safety Viewpoint – Sidney J. Williams, Public Safety Division, National Safety Council

2:00 p.m. — **Aircraft**

T. P. Wright, Chairman

A Summary of N.A.C.A. Investigations of High-Lift Devices – Carl J. Wenzinger, National Advisory Committee for Aeronautics

The Characteristics of a Deflector-Plate Flap – R. C. Molloy and R. W. Griswold, II, United Aircraft Corp.

2:00 p.m. — **Exhaust Gas**

J. B. Macauley, Jr., Chairman

Forum on Exhaust Gas Analysis. For Members Only – Informal Discussions – No Preprints – No Publicity

8:00 p.m. — **Junior – Student**

Auspices Detroit Section

A. C. Hazard, Chairman

Sub-Stratosphere Flying –D. W. Tomlinson, Transcontinental and Western Airlines

Progress in Television – Demonstration and Exhibition – A. F. Murray, Philco Radio and Television Corp.

Tuesday, Jan. 10

10:00 a.m. — **Aircraft Engine**

Robert Insley, Chairman

Dynamic Suspension, a Method of Aircraft-Engine Mounting – K. A. Browne, Wright Aeronautical Corp.

Aircraft-Engine Valve Mechanisms – V. C. Young, Wilcox-Rich Division, Eaton Mfg. Co.

10:00 a.m. — **Transportation and Maintenance**

H. O. Mathews, Chairman

Filtering Fallacies – Austin M. Wolf, Consulting Engineer, New York City.

2:00 p.m. — **Aircraft**

F. W. Caldwell, Chairman

Composite Wood and Plastic Propeller Blades – F. E. Weick, Engineering and Research Corp.

The Choice of Operating Speeds for Propellers of Limited Diameter – T. B. Rhines, United Aircraft Corp.

2:00 p.m. — **Passenger-Car Engine**

C. R. Paton, Chairman

Symposium on Troubles from Varnish in Engines – Presented by F. F. Kishline, Willys-Overland Motors, Inc., for the Passenger Car Activity Committee

Welded Steel Cylinder Blocks – Everett Chapman, Lukenweld, Inc.

8:00 p.m. — **Business Session**

President C. W. Spicer in the Chair

Nomination and Election of Members-at-Large of Annual Nominating Committee

Announcement of Election of Officers for 1939

Presentation of Life Membership to Past-President R. R. Teetor

8:15 p.m. — **Aircraft Engine**

Arthur Nutt, Chairman

Manly, the Engineer – C. B. Veal, Society of Automotive Engineers

Wednesday, Jan. 11

★ **NATIONAL DEFENSE DAY** ★

10:00 a.m. — **Land Transportation**

Col. H. W. Alden, Chairman

Military Motor Vehicles – The Problems of the Quartermaster Corps – Maj.-Gen. Henry Gibbins, Quartermaster General

Automotive Ordnance – Maj.-Gen. C. M. Wesson, Chief of Ordnance

2:00 p.m. — **Air Transportation**

E. P. Warner, Chairman

Performance and Development Trends in Military Aircraft and Accessories – Maj.-Gen. Henry H. Arnold, Chief of Air Corps

Mutual Problems of Military and Civil Aviation in the Field of Air Transportation – Capt. John Towers, Assistant Chief, Bureau of Aeronautics

6:30 p.m. — **Dinner**

B. C. Heacock, Toastmaster

Industrial Mobilization for National Defense – Brig.-Gen. C. T. Harris, Jr., Assistant to Chief of Ordnance

C. W. Spicer, President
W. J. Davidson, President-Elect

(Dinner limited to SAE members and applicants only)
Tickets, $3.50 — Informal

Engineering Exhibit

Every inch of space has been taken for the 1939 Engineering Exhibit, a feature of the SAE Annual Meeting. The following companies will have displays:

Acheson Colloids Corp.
Air Reduction Sales Co.
Aluminum Co. of America
Aluminum Industries, Inc.
American Bosch Corp.
American Felt Co.
Campbell, Wyant & Cannon Foundry Co.
Cities Service Oil Co.
Cleveland Graphite Bronze Co.
DeLuxe Products Corp.
Diesel Equipment Corp.
Doehler Die Casting Co.
Fleming Mfg. Co.
Garlock Packing Co.
Gear Processing, Inc.
Gemmer Mfg. Co.
Hercules Motors Corp.
K. L. Herrmann
International Nickel Co., Inc.
Koppers Co. – American Hammered Piston Ring Division
Monroe Auto Equipment Co.
Monsanto Chemical Co.
Motor Improvements, Inc.
Ohio Crankshaft Co.
Rohm & Haas Co.
Spicer Mfg. Corp.
Stewart-Warner Corp.
Timken Roller Bearing Co.
Victor Mfg. & Gasket Co.
Waukesha Motor Co.
Zollner Machine Works

JAN 9 to 13 • DETROIT

Thursday, Jan. 12

10:00 a.m. Fuels and Lubricants

B. E. Sibley, Chairman

Power Loss Accompanying Detonation – Neil MacCoull, The Texas Co.

Spark Timing and Its Relation to Road Octane Numbers and Engine Performance – T. B. Rendel and L. E. Hebl, Shell Petroleum Corp.

10:00 a.m. Passenger-Car Tires

J. E. Hale, Chairman

Pneumatic Tires as They Should Be Engineered for Our Future Cars – W. S. James, Studebaker Corp., and P. C. Ackerman, Chrysler Corp.

Designing the Tire for the Car – E. A. Roberts, Firestone Tire & Rubber Co.

2:00 p.m. Fuels and Lubricants

D. P. Barnard, Chairman

Fuel and Lubricant Requirements for Gasoline, Compression-Ignition, and Spark-Ignition Oil Engines – J. B. Fisher, Waukesha Motor Co.

Automotive Multicylinder Engine Detonation and Mixture Distribution – A. J. Blackwood, C. B. Kass and O. G. Lewis, Standard Oil Development Co.

***Visit* the Exhibit of**
Photographs
by SAE Members

2:00 p.m. Passenger-Car Body

F. S. Spring, Chairman

The Development of Foamed Latex Cushioning – E. E. Ellies, Airfoam Division, Goodyear Tire and Rubber Co.

Trends in Mobile Air Conditioning – R. E. Gould, Frigidaire Division, General Motors Sales Corp.

8:00 p.m. Passenger-Car Chassis

W. C. Keys, Chairman

Passenger Car Road Noise – E. E. Wilson and Paul Huber, General Motors Proving Ground

Friday, Jan. 13

10:00 a.m. Diesel Engine

F. G. Shoemaker, Chairman

Symposium on Piston Temperatures – E. T. Vincent, University of Michigan, will present a digest of a number of contributions on piston temperatures

2:00 p.m. Diesel Engine

Carl Behn, Chairman

Engine Indication with the Cathode Ray Oscillograph – J. G. Williams, Superior Engine Division, National Supply Co.

Duration of Combustion in a Commercial Diesel Engine – A. F. Robertson, R. A. Rose and G. C. Wilson, University of Wisconsin

Applications Received

The applications for membership received between Nov. 15, 1938, and Dec. 15, 1938, are listed herewith. The members of the Society are urged to send any pertinent information with regard to those listed which the Council should have for consideration prior to their election. It is requested that such communications from members be sent promptly.

Canadian Section

DEPARTMENT OF TRANSPORT, Ottawa, Ont.

HORN, J. M., field engineer, Massey-Harris Co., Ltd., Toronto, Ont.

Chicago Section

CARLSON, NORMAN E., automotive engineer, Swift & Co., U. S. Yards, Chicago.

FODOR, NICHOLAS, vice-president in charge of engineering, Diesel Equipment Corp., Chicago.

GRANT, E. R., superintendent, C. E. Niehoff & Co., Chicago.

Cleveland Section

BLACK, ROBERT FACER, president, White Motor Co., Cleveland.

ELLIOTT, MUNSON, technical training, General Motors Sales Corp., Diesel Engine Division, Cleveland.

SCOTT, KENNETH DUKE, JR., illuminating engineer, Incandescent Lamp Department of General Electric Co., Cleveland.

Dayton Section

SCHMIDT, RICHARD B., tool design department, International Harvester Co., Springfield, O.

Detroit Section

BLOCK, CHARLES L., draftsman, U. S. Rubber Products Co., Detroit.

COLLET, L. G., member, engineering tests department, General Motors Proving Ground, Milford, Mich.

COOPER, JAMES H., works manager, McCord Radiator & Mfg. Co., Detroit.

DEVEREUX, JOHN E., engineer, Detroit Rex Products, Detroit.

HANSEN, KAI O., gear designer, Thorco Products, Inc., Dexter, Mich.

MCCRENSKY, HAROLD, sales engineer, Peninsular Grinding Wheel Co., Detroit.

MORSE, CLAUDE A., sales representative, Tung-Sol Lamp Works, Inc., Detroit.

SANDS, C. C., branch manager and sales engineer, Zenith Carburetor Division, Bendix Aviation Corp., Detroit.

STANLEY, S. C., sales engineer, Harris Products Co., Detroit.

WINSLOW, LESTER C., sales engineer, Harris Products Co., Detroit.

Indiana Section

HEHNER, N. E., chief engineer, Prest-O-Lite Storage Battery Corp., Indianapolis.

Metropolitan Section

BROOKSBANK, ARTHUR WOOD, production manager, Ranger Engineering Corp., Farmingdale, N. Y.

CARLSON, GERALD I., draftsman, Ranger Engineering Corp., Farmingdale, N. Y.

GRUNDMAN, HERBERT, test engineer, Ranger Engineering Corp., Farmingdale, N. Y.

HALLETT, ROBERT L., chief chemist, National Lead Co., Brooklyn, N. Y.

HARKLEROAD, IVAN, experimental test engineer, Wright Aeronautical Corp., Paterson, N. J.

MCDONALD, JOHN N., Wright Aeronautical Corp., Paterson, N. J.

MULLIKEN, RICHARD F., project engineer, Ranger Engineering Corp., Farmingdale, N. Y.

PROBST, JOSEPH, draftsman, Grumman Aircraft Engineering Corp., Bethpage, L. I., N. Y.

HORENBURGER, WILLIAM E., automotive engineer, National Carbon Co., Inc., New York.

RUNGE, REGINALD H., engine layout, Ranger Engineering Corp., Farmingdale, N. Y.

WINTER, MURRAY, 1653-65th St., Brooklyn, N. Y.

Milwaukee Section

BROCKEN, KARL, associate, Brooks Stevens – Industrial Design, Milwaukee.

HANNERS, HARVEY W., experimental engineer, Allis-Chalmers Mfg. Co., West Allis, Wis.

Northern California Section

KELLEY, ELDON J., sales, service, E. H. White Co., San Francisco.

Philadelphia Section

AUERBACH, S. MORTIMER, 801 North New Hampshire Ave., Atlantic City, N. J.

PEW, JOHN G., president, Sun Shipbuilding & Dry Dock Co., Chester, Pa.

Pittsburgh Section

JACKSON, HARRY WELLINGTON, Canadian representative, Bendix-Westinghouse Automotive Air Brake Co., Pittsburgh.

SHERTS, J. HERVEY, technical administrator, Pittsburgh Plate Glass Co., Pittsburgh.

St. Louis Section

BERRY, DAVID L., junior mechanical engineer, Shell Petroleum Corp., Wood River, Ill.

Southern California Section

ALLARD, JESSE H., sales manager, industrial division, Pacific Chemical Co., Los Angeles.

PALMER, RICHARD W., chief engineer, Vultee Aircraft, Division of Aviation Mfg. Corp., Downey, Calif.

PRITCHARD, ROBERT J., editor, *Western Flying*, Los Angeles.

TOWNSEND, HENRY GLENN, superintendent, Menasco Mfg. Co., Los Angeles.

Southern New England Section

PEASE, JULIAN C., New Britain Machine Co., New Britain, Conn.

Washington Section

HAMILTON, DONALD MENZIES, engineer, U. S. Forest Service, Washington, D. C.

HAMMOND, WILLOUGHBY NASON, assistant aeronautical engineer, Civil Aeronautics Authority, Washington, D. C.

Outside of Section Territory

CHAPPELLE, H. THOMAS, chief engineer, Chappelle Engineering Co., Wichita Falls, Texas.

HEWITT, THOMAS HOWARD, mechanical engineer, South Carolina State Highway Department, Columbia, S. C.

HIGGINS, ANDREW J., president, Higgins Industries, Inc., New Orleans, La.

KESTERSON, TOM O., senior pilot in charge of aviation, Tennessee Valley Authority, Knoxville, Tenn.

ROGERS, JOHN C., vice-president, Genuine Parts Co., Atlanta, Ga.

Foreign

HAYES, THOMAS, managing director, Hayes Bros., Ltd., Limerick, Ireland.

JUDSON, CHARLES ALLEN, designer, Messrs. Rolls-Royce, Ltd., Derby, England.

LARRABURE, LOUIS J. K., chief engineer, Inspectoria Technica do Instituto do Acucar e do Alcool, Sao Paulo, Brazil, S. A.

OWNER, FRANK MORGAN, assistant chief engineer, Bristol Aeroplane Co., Ltd., Bristol, Eng.

PINK, ERNEST PATRICK, purchasing agent, Iraq Petroleum Co., Ltd., London, England.

STRATIGOS, ANTHONY JOHN, branch service organiser, Ford Motor Co. of Australia, Pty., Ltd., Geelong, Victoria, Australia.

New Members Qualified

These applicants who have qualified for admission to the Society have been welcomed into membership between Nov. 15, 1938, and Dec. 15, 1938.

The various grades of membership are indicated by: (M) Member; (A) Associate Member; (J) Junior; (Aff.) Affiliate Member; (SM) Service Member; (FM) Foreign Member.

Baltimore Section

HOGAN, ROBERT W. (A) field representative, Ethyl Gasoline Corp., 1102 Court Square Bldg., Baltimore, Md.

Canadian Section

BELL, W. THOMAS A. (A) lubrication sales manager, Imperial Oil, Ltd., 56 Church St., Toronto, Ont. (mail) 42 Braemar Ave.

CARR, MURRAY O. (A) owner, Murray Carr & Co., 43 Dundas St., West, Toronto, Ont.

GILLESPIE, ROBERT GEORGE (J) department engineer, Garage, Toronto Transportation Commission, 35 Yonge St., Toronto, Ont. (mail) 358 Davenport Road.

RIVARD, THOMAS (A) school principal, Mountjoy School Board No. 3, Timmins, Ont. (mail) Opasatika, Ont.

TELFORD, ROBERT J. (A) vice-president, general manager, Reo Motor Co. of Canada, Ltd., Leaside, Toronto, Ont.

Chicago Section

BJELLAND, CARL W. (A) tune-up mechanic, Sinclair Refining Co., 2540 West Cermak Road, Chicago (mail) 377 May Ave., Glen Ellyn, Ill.

COOK, DEWEY D. (A) president, Cooktite Ring Sales Co., 1737 Howard St., Chicago.

EDELMANN, ROBERT B. (J) vice-president, E. Edelmann & Co., 2332 Logan Blvd., Chicago.

HAMILTON, MAURICE L. (A) engineer, Sinclair Refining Co., Engine Lab., East Chicago, Ind.

JANDASEK, VLADIMIR J. (J) International Harvester Co., 2600 West 31st Blvd., Chicago (mail) 4837 West 25th St., Cicero, Ill.

WOOD, HARRY H. (A) sales representative, Gulf Refining Co., Nicholas Bldg., Toledo, Ohio (mail) P. O. Box 16, Mishawaka, Ind.

Cleveland Section

CAMERON, LELAND HALL (J) salvage supervisor, General Motors Corp., Cleveland Diesel Engine Division, 2160 West 106th St., Cleveland (mail) 1383 Gladys Ave., Lakewood, Ohio.

WOLCOTT, L. C. (M) chief engineer, Packard Electric Div., General Motors Corp., Warren, Ohio.

Dayton Section

HUNTINGTON, FREDERICK WILLIAM, Lieut.-Col. (SM) executive officer for organized reserve, U.S. Army, Infantry, 318 Federal Bldg., Dayton, Ohio.

JOLLEY, FRANK E. (M) chief, division of

(*Concluded on page 17*)

New Members Qualified

(*Concluded from page 16*)

motor transportation, State Highway Dept., Columbus, Ohio (mail) 99 N. Stanwood Road.

Detroit Section

CHAPMAN, RICHARD D. (J) student engineer. Chrysler Corp., Engineering Division, Highland Park, Mich. (mail) 2233 St. Clair, Detroit.

FAGER, OSCAR HENRY (A) special lubrication representative, Shell Petroleum Corp., 904 Griswold Bldg., Detroit (mail) 25 Highland, Highland Park, Mich.

GLATHAR, WILLY (A) representative, General Motors Overseas Operations, Detroit.

GOAD, LOUIS CLIFFORD (M) general manager, AC Spark Plug Division, General Motors Corp., Flint, Mich.

LONEY, HARLEY C. (A) president, Harley C. Loney Co., 16883 Wyoming Ave., Detroit.

MCINTYRE, CHARLES S. (A) secretary, service manager, Monroe Auto Equipment Co., Monroe, Mich.

STICA, ALBERT L. (M) designer, Edward G. Budd Mfg. Co., Detroit (mail) 11235 Wayburn Ave.

WIDMAN, CHARLES HENRY (A) vice-president, director of sales, Murray Corp. of America, 7700 Russell St., Detroit.

Kansas City Section

DRANEY, JOHN J. (A) detail draftsman, Weber Engine Co., 1100 Winchester Ave., Kansas City, Mo. (mail) 1300 Northern Blvd., Independence, Mo.

KAMPMEIER, LESTER (A) mechanic, Phillips Petroleum Co., Bartlesville, Okla. (mail) 10 North 16th St., Kansas City, Kan.

RUMMEL, ROBERT WILAND (J) chief engineer, Rearwin Airplanes; Ken-Royce Aircraft Engine Co., Fairfax Airport, Kansas City, Kan.

Metropolitan Section

BATORI, STEPHEN M. (J) maintenance engineer, Connecticut Railway & Lighting Co., 55 Congress St., Bridgeport, Conn. (mail) University Club.

COPLEY, CHARLES J. (M) sales engineer, Socony-Vacuum Oil Co., Inc., 26 Broadway, New York.

GITLIN, JACK (A) service manager, Atlantic Transportation Co., Inc., New York (mail) 1055 Ward Ave.

HALL, THOMAS JOHN (A) inspector, Brooklyn Bus Corp., 990 Third Ave., Brooklyn, N. Y. (mail) 500 Montgomery St.

JONES, LINCOLN, JR. (M) operations manager, Middlesex Transportation Co., New Brunswick, N. J. (mail) 59 South Adelaide Ave.

KAMIJO, TSUTOMU (A) engineer, Mitsubishi Shoji Kaisha, Ltd., 120 Broadway, New York.

PASCOE, EDWIN WILLS (J) draftsman, Wright Aeronautical Corp., Paterson, N. J. (mail) 128 Ward St.

ROMAN, ALFRED I. (J) 835 Riverside Drive, New York.

Milwaukee Section

BAYERLEIN, ROLAND W. (A) sales manager, Nordberg Mfg. Co., Milwaukee.

FRIEND, JAMES A. (A) vice-president, purchasing agent, Nordberg Mfg. Co., 3073 South Chase Ave., Milwaukee.

New England Section

ROGERS, WILLIAM M. (A) cooperative instructor, School Dept., City of Boston, 15 Beacon St., Boston (mail) 127 Park St., Newton, Mass.

STANLEY, HAROLD D. (M) vice-president, superintendent, Perrine Qualty Products Corp., Waltham, Mass. (mail) 55 Rumford Ave.

Northern California Section

SHAWK, HARRY ABEL (M) chief laboratory engineer, Tide Water Associated Oil Co., Associated Div., San Francisco.

Northwest Section

BROWN, WALLACE M. (J) draftsman, Kenworth Motor Truck Corp., 1263 Mercer St., Seattle, Wash. (mail) 741 Bellevue, North.

PENNELL, DONALD F. (A) sales engineer, Kenworth Motor Truck Corp., 1263 Mercer St., Seattle, Wash.

Philadelphia Section

ERRIG, WILLIAM F. (A) president, Peco Mfg. Corp., Hope St. & Indiana Ave., Philadelphia.

Pittsburgh Section

AUSTEN, ROBERT N. (A) sales manager, Iron City Spring Co., 2920 Smallman St., Pittsburgh, Pa.

St. Louis Section

PHELPS, C. H. (M) research engineer, Weaver Mfg. Co., Springfield, Ill. (mail) 1600 Noble Ave.

SQUYER, ALBERT R. (M) chief engineer, Weaver Mfg. Co., 2171 South Ninth St., Springfield, Ill. (mail) 1801 South Fourth St.

Southern California Section

GRIEP, E. F. (M) research engineer, Standard Oil Co. of Calif., Richmond, Calif. (mail) 310 Romona Ave., El Cerrito, Calif.

Southern New England Section

BROSSEAU, ALPHONSE L. (A) owner, Brosseau's Garage, Springfield, Mass. (mail) 29 Carew Terrace.

CROCKER, ALBERT R. (J) engine tester, Pratt & Whitney Aircraft Co., East Hartford, Conn (mail) 16 Gold St.

VAN ALSTYNE, HAROLD L. (M) aeronautical engineer, Hamilton Standard Propellers, Engineering Department, 400 South Main St., East Hartford, Conn.

Washington Section

LACY, GEORGE B. (A) truck sales and lease, Parkway Motor Co., Inc., 3040 M St., North West, Washington (mail) 2417 Huidekoper Place, North West.

RUTENBERG, NICHOLAS (A) owner, Rutenberg Tire Co., Inc., 2701 West Broad St., Richmond, Va.

Outside of Section Territory

BOEHMISCH, WM. (A) foreman, Indian Territory Illuminating Oil Co., Oklahoma City, Okla. (mail) 4577 Capitol Hill.

DE BEAUMONT, PIERRE STUART (J) draftsman, Henry R. Hinckley, Inc., Southwest Harbor, Me.

MCINERNEY, JAMES L. (M) president, McInerney Spring & Wire Co., 1544 Jefferson, South East, Grand Rapids, Mich.

Foreign

BAPTIST, WILLIAM EDWARD (FM) charge, hand test inspector, DeHavilland Aircraft Co., Ltd., Edgware, Middlesex, England (mail) "Elleschene" 115 Whitchurch Gardens, Middlesex, England.

TULLY, ALAN CARR (FM) manager, Australasia & New Zealand, Ethyl Export Corp., 368 Collins St., Melbourne, C 1, Australia.

About Authors

(*Continued from page 7*)

U. S. Rubber Co., with which he is still affiliated, as design engineer of some of the early automatic tire machinery then in process of development. In 1925 he changed over to tire design and construction work and was appointed manager of the construction department two years later. For the past four years Mr. Ewart has been devoting his time to the problems of coordinating tire design and construction to give the best performance of tires on the modern car.

● **F. L. Haushalter** ***(M '35) has been affiliated with the B. F. Goodrich Co. since 1919. He spent his first eight years in the testing laboratory and since then has devoted his time to the development of mechanical rubber goods of various kinds. He had an important part in the development of rubber-to-metal mountings for automobile and aircraft engines and has designed rubber mountings for heavy machinery as well as for all types of small commercial machines. He is author of many papers on the properties of rubber for particular applications to resist shock and abrasion, and also on rubber bearings for shafts of small and large vessels. Mr. Haushalter graduated in electrical engineering from Ohio State University in 1917 and received his E.E. degree from that institution in 1926. During the War he served with the 56th and 71st Engineers.***

● **H. A. Hicks** ***(M '30), after joining the Chrysler Corp. in 1932, assisted in the design of the Chrysler Airflow Car. Later he organized the structures department of the Chrysler engineering division which, during the past six years, has assisted research, production, design and experimental work by the development of methods of structural analysis and testing. The department also handles stress analysis, aerodynamic testing, and the design of new structures. Mr. Hicks graduated from the U. of Michigan in mechanical engineering in 1916, receiving his M.S.E. the following year. During the War he was aeronautical mechanical engineer on the staff of Colonel Hall, assisting in the development of the Liberty aviation engine and fighting planes. In 1919 he joined Ford Motor Co. as designer. His designs projected and built included a gasoline railway car, automobile engines, and several speed-boat engines and speed boats. Later he was in charge of Model A engine development. For seven years he was head of all-metal airplane design work until airplane production was discontinued by the Ford Company.***

● **J. B. Macauley, Jr.** ***(M '24) is responsible for the direction of many of the research problems carried on by the Engineering Division of Chrysler Corp. During his 15 years with this company he has acted as head of the Power Plant Division and as chief engineer of the Chrysler Division. His activities in problems mutual to the automotive and petroleum industries have included membership on many of the Society's fuels and lubricants committees.***

● **A. T. McDonald** ***has been associated with the oil business continuously since 1918, except for a brief period during the World War when he was connected with the Hercules Powder Co. He was with the Union Oil Co. laboratories at Oleum, Calif., from 1918-1920. In 1921 he joined the Associated Branch of the Tidewater Associated Oil Co., working in their development laboratories until 1936. In that year he joined the Caterpillar Tractor Co., where he now is in charge of petroleum research.***

(*Concluded on page 28*)

About SAE Members:

Commemorating the thirty-fifth anniversary of Wilbur and Orville Wright's first flight, **ORVILLE WRIGHT,** survivor of the two famous brothers, was guest of honor at a celebration in Dayton. **CHARLES F. KETTERING** and **HENRY FORD** were among the many industrial leaders who attended the event. Mr. Kettering was one of the speakers. At Kill Devil Hill, Kitty Hawk, N. C., the site of the famous flight, another celebration was being held at the same time.

W. R. ANGELL, JR., manager, aircraft division, Continental Motors Corp., has been named a vice-president of the newly organized Continental Aeronautical Corp., which will manufacture metal wings, wing tips, spars, and braces.

GLENN L. MARTIN, president of the Glenn L. Martin Co., has been appointed by Governor-Elect Herbert R. O'Conor of Maryland to a non-partisan citizens' committee of nine members which is to make a survey of state departments and institutions and recommend steps for reorganization and more economical and efficient operation.

JOHN W. VOTYPKA, who for the past 12 years has been chief engineer of the Le-Baron Division of Briggs Mfg. Co., recently was appointed chief engineer of the Fruehauf Trailer Co.

Effective Jan. 1, **WALTER A. PARRISH** joined the engineering staff of Caterpillar Tractor Co. as engine designer. Mr. Parrish was

W. A. Parrish
Joins Caterpillar

chief engineer of the Buda Co. in charge of design and laboratory development of automotive, marine, and industrial gasoline and diesel engines, prior to his resignation, Nov. 30. He had been affiliated with Buda since 1929. Mr. Parrish is secretary of the Chicago Section.

REID RAILTON designed the body of the British M.G. 1100 cc (67 cu in.) car which earned the title of "the fastest small car ever built" by setting the record for its class of 186.616 mph over a measured mile on the Frankfurt (Germany) Autobahn, Nov. 9. The fastest timed run in one direction was 194.386 mph.

ANDREW L. VARGHA has joined the Cadillac Motor Car Division of GMC as designer. He had previously resigned from Adam Opel, A.G., Russelsheim, Germany, with which he had been associated for three years. Prior to that, Mr. Vargha was in the engineering department of Chevrolet for 11 years.

JOSEPH C. THOMPSON has joined the Gaylord Container Corp., St. Louis, as plant engineer. Before this change he was vice-president and treasurer of Pirrung, Inc., Indianapolis.

ROLLAND D. KOENITZER is affiliated with the Young Radiator Co., Racine, Wis., as sales engineer. He previously was chief engineer of the Perfex Corp., Milwaukee.

COL. WILLIAM G. WALL is reported well on the road to recovery after an accident which occurred several months ago when he was breaking in a young horse.

J. CARLTON WARD, JR., has been elected vice-president and director of United Aircraft Corp., and general manager of the Pratt & Whitney Aircraft Division. Mr. Ward has devoted the major part of his professional career, first to the building of precision machines typical of those used in the construction of the

J. C. Ward, Jr.
Advanced

modern aircraft engine and more recently to the building of the engines themselves. Prior to his promotion he was assistant general manager of Pratt & Whitney Aircraft.

DAVID E. ANDERSON recently resigned as chief engineer of the Bohn Aluminum & Brass Corp. to join the Holley Carburetor Co. as engineer, specializing in engine problems and ignition.

RICHARD B. NEWELL, formerly chief engineer of the Tricoach Corp., Seattle, Wash., is now chief engineer of the Pacific-Tricoach Division of the Pacific Car & Foundry Co., Renton, Wash.

WALTER S. PEPER, formerly in the fleet sales division of the Packard Motor Car Co. of New York, has joined Smith & Gregory of New York, Inc., as sales manager of the Westinghouse Air Brake Division. Mr. Peper was active in the management of the recent National Motor Truck Show. He is a past-chairman of the Metropolitan Section.

FRANK E. WATTS, long affiliated with the Hupp Motor Car Corp., as its chief engineer since 1916 and as a vice-president since 1937, has established a practice as consulting engineer at 2516 La Salle Gardens, Detroit. Mr. Watts has had wide experience in the automotive in-

F. E. Watts
Consultant

dustry, with which he has been associated for more than 30 years.

GEORGE B. UPTON, professor of automotive engineering, Sibley School of Mechanical Engineering, Cornell University, analyzes the mechanical action of the now universally applied synchronizers in gear transmissions of automobiles in the recently published Bulletin No. 25 of the Cornell University Engineering Experiment Station.

When the American Society of Mechanical Engineers held its 59th Annual Meeting in New York last month, papers were presented by SAE Members **L. M. GOLDSMITH,** Atlantic Refining Co., **CHARLES G. THATCHER,** Swarthmore College, and **COL. G. F. JENKS,** United States Army. **WILLIAM L. BATT,** SKF Industries, Inc., a past-president of the ASME, was toastmaster at the banquet.

ROY FRUEHAUF has been advanced to the post of vice-president and director of sales of the Fruehauf Trailer Co. Prior to this promotion, Mr. Fruehauf was vice-president in charge of western operations.

PERCY A. BROWN, formerly chief inspector, Graham-Paige Motors Corp., has joined the production engineering department of the Packard Motor Car Co.

LLOYD H. DIEHL, president, and **E. W. DIEHL,** secretary-treasurer, of the Detroit Gasket & Mfg. Co., have been named directors of the recently organized firm, Extruded Metals, Inc., of Belding, Mich.

GEORGE F. STEIN, formerly a student at the University of California, is machinist with M. Davidson & Co., Stockton, Calif.

W. J. O'Neil Named President of Dodge

W. J. O'NEIL has been named president and general manager of the Dodge Division of Chrysler Corp. Prior to this advancement he was vice-president and general manager. Mr. O'Neil has been active in the management of the Dodge Division since the Chrysler Corp. bought the Dodge properties in 1928. His affiliation with the automotive industry began in 1907. **K. T. KELLER,** president of Chrysler Corp., had been president of Dodge prior to Mr. O'Neil's appointment.

EDMOND W. STAFFORD has been transferred from Chicago to Long Island City, N. Y., by the Loose-Wiles Biscuit Co. He is in the general automotive department which has changed its headquarters to the latter city.

J. G. KREYER, development engineer, Firestone Tire & Rubber Co., recently was interviewed "on the air" by Station WADC on the subject, "Rubber on the Farm."

Three James Jackson Cabot Professorship Lectures, presented at Norwich University by **EDWARD P. WARNER** and **JOHN JAY IDE,** have been published by the University. Mr. Ide's lecture, presented during the 1934-1935 college year, entitled "International Aeronautic Organizations and the Control of Air Navigation," was brought up to date preparatory to publication. The two lectures by Mr. Warner, "The Early History of Air Transportation" and "Technical Development and its Effect on Air Transportation," were presented during the 1937-1938 college year in a series of five lectures delivered by the author. Mr. Warner's other lectures are in process of publication. The James Jackson Cabot Professorship of Air Traffic Regulation and Air Transportation of Norwich University was endowed in 1935 by Dr. Godfrey Lowell Cabot, of Boston, and named in memory of his son, James Jackson Cabot, an officer in the United States Flying Service during the World War.

E. K. WALDSCHMIDT, who has been metallurgical engineer in the Detroit office of Jones & Laughlin Steel Corp., recently was transferred to the company's Pittsburgh works as assistant metallurgist.

THOMAS MIDGLEY, JR., is one of five members of the Ethyl Gasoline Corp. staff who have been awarded emblems in recognition of 15 years of service. The Ethyl Gasoline Corp. was founded in 1924 to manufacture and distribute Ethyl fluid which was discovered by Mr. Midgley, who is now vice-president of the corporation, recently was reelected to the board of the American Chemical Society.

PAUL G. HOFFMAN, president of Studebaker Corp., took "Free Enterprise – Can It Survive? – Main Street Talks to Wall Street" as his subject when he spoke before the Bond Club of New York early last month.

FREDERICK C. BRANDT has joined Bowen Industries, Ecorse, Mich., as engineer. Previously he was with the Pontiac Motor Division of GMC as die designer.

When the Highway Research Board held its Annual Meeting at Washington, D. C., during the week of Nov. 28, papers were presented by SAE Members **W. E. LAY,** professor of mechanical engineering, University of Michigan, and **MILLER McCLINTOCK,** director, Bureau for Street Traffic Research, Yale University.

SAE Appointments

OPIE CHENOWETH to Manly Memorial Medal Board of Award for three years. . . . **J. C. HUNSAKER** to Wright Brothers Medal Board of Award for same period. . . . **S. W. SPARROW** as chairman of Advertising Committee. . . . **ROBERT CASS** to Motor Truck Rating Committee. . . . **CHARLES W. ANKLAM** to the lighting division of the Standards Committee. . . . **F. K. GLYNN** as SAE representative on the Standards Council of the American Standards Association. . . . **AUSTIN M. WOLF** as alternate. . . . **R. M. RIBLET** and **GUNNAR PALMGREN** SAE representatives on the Sectional Committee on Ball and Roller Bearings under ASA. . . . **J. H. EVANS** a member at large. . . . **F. W. KATELEY** as an SAE representative on the American Society of Refrigeration Engineers' Committee on Rating and Testing Refrigerated Trucks and Buses.

George W. Smith

George W. Smith of the Cleveland Diesel Division of General Motors Sales Corp., was fatally injured Dec. 9 in an automobile accident which occurred near Toledo. Mr. Smith, who had been a member of the Society since 1913, was a past-chairman of the Milwaukee and Chicago Sections.

Mr. Smith was a prominent figure in the automotive industry, with which he had been affiliated since 1908. At that time he was with the Westinghouse Air Brake Co. developing a special transmission for automobiles and trucks. In 1913 he joined the Thomas B. Jeffery Co. as engineer and chief draftsman. From 1916 to 1926 he was with Nash Motors Co., becoming chief engineer of the four-cylinder division in 1921. He went with Buick in 1926, serving as engineer, chassis division, until last fall when he joined the Cleveland Diesel Division of General Motors Sales Corp.

Mr. Smith was born in Wisconsin in 1881. His common school education was augmented by night school courses and practical engineering experience.

Edward L. Valance

Edward L. Valance, assistant general manager of the Houde Engineering Corp., died Nov. 24, following an operation. He was 56 years old and a native of Buffalo.

Mr. Valance, who had been a member of the SAE since 1935, was widely known in the automotive industry. He had been associated with it since 1912, when he was manager of the Simcott Automobile Co. of Buffalo, distributors of the Simplex, Kissel and Westcott automobiles. In 1915 he became sales manager of the Ericsson Mfg. Co., and built up a nation-wide distribution and service organization for the marketing of the Berling magneto. He spent 1920 and 1921 designing and developing the "Economy Truck" which was made and marketed in Sweden.

In 1923 Mr. Valance became associated with Pratt & Lambert, Inc., as an executive in the sales department, a position he held until he joined the Houde organization in 1928. With Houde he served successively as retail sales manager, general service manager, and assistant general sales manager, before his appointment as assistant general manager.

SAE *Coming* EVENTS

Annual Meeting
and Engineering Display
Jan. 9-13 Detroit, Mich.
Book-Cadillac Hotel

National Aeronautic Meeting
March 16-17 Washington, D. C.
Hotel Washington

World Automotive Engineering Congress
May 22-June 8

Baltimore – Jan. 5

Engineers Club; dinner 6:30 p.m. Service Tests on Various Lubricants in a Fleet of Refinery Delivery Trucks – F. C. Burk, supervisor, Automotive Laboratory, Atlantic Refining Co.

Buffalo – No Meeting

Canadian – Jan. 18

Royal York Hotel, Toronto; dinner 7:00 p.m. Mechanization of Armies – Col. M. O. Carr, Canadian Department of National Defense.

Chicago – No Meeting

Cleveland – Jan. 16

Cleveland Club; dinner 6:30 p.m. Subject – National Defense.

Detroit – Jan. 9 to 13

Book-Cadillac Hotel. Participation in Annual Meeting of the Society.

Indiana – No Meeting

Kansas City – No Meeting

Metropolitan – Jan. 19

Hotel New Yorker, New York City; dinner 6:30 p.m. Cars of the Future – William B. Stout, president, Stout Engineering Laboratories, Inc., and Henry M. Crane, technical assistant to the president, General Motors Corp.

New England – Jan. 10

Engineers Club, Boston, Mass.; dinner 6:30 p.m. Subject – Developments in Diesel Engineering.

Northwest – Jan. 14

New Washington Hotel, Seattle; Annual Frolic and Ladies' Night 9:00 p.m. Buffet Supper 11:00 p.m.

Northern California – Jan. 10

Hotel Leamington, Oakland; dinner 6:30 p.m. Existing Regulations Pertaining to Motor Carriers; from the Federal Viewpoint – Russell Bevans, district supervisor, Bureau of Motor Carriers, Interstate Commerce Commission; from the Viewpoint of the State – W. R. Sharkey, supervising inspector, State Highway Patrol, Sacramento.

Oregon – Jan. 13

Congress Hotel, Portland; dinner 6:30 p.m. Bus Maintenance and Practices – T. C. Howe, superintendent of equipment, North Coast Transportation Co. Diesel Transportation Problems – John L. Snead, Jr., superintendent of operations, Consolidated Freight Lines, Inc.

Philadelphia – No Meeting

Pittsburgh – Jan. 17

Webster Hall; dinner 6:30 p.m. Subject – Carburetion.

St. Louis – Jan. 25

Public Service Co. – Forest Park; dinner 6:30 p.m. Lubrication of Rear Engines – A. L. Heintze, staff engineer, research, development and application, Sinclair Refining Co.

Southern New England – Jan. 4

Hotel Bond, Hartford, Conn.; dinner 6:30 p.m. Speaker – T. P. Wright, vice-president, director of engineering, Curtiss-Wright Corp.

Syracuse – Jan. 30

Onondaga Hotel; dinner 6:30 p.m. Aeronautic Meeting. Speaker – I. I. Sikorsky, vice-president in charge of engineering, Sikorsky Aircraft Division, United Aircraft Corp.

Washington – No Meeting

News of the Society

Ralph Teetor Speeds World Congress Plans in Quick Year-End Conferences

World-Congress Year is here!!

Just before it arrived, National Meetings Committee Chairman Ralph R. Teetor intensified his activity in preparation for the great event – the SAE World Automotive Engineering Congress which opens in New York on May 22 and closes in San Francisco June 8.

Prolific with results was a conference in Indianapolis with T. E. ("Pop") Myers of the Indianapolis Motor Speedway. Congress guests are going to have a chance to inspect the cars the day before the race, meet some of the drivers and attend an official meeting at which drivers are given their final instructions. The race itself will be viewed by Congress members and guests from a reserved section of the grandstand near the starting line . . . and for the first time in history, members will enjoy the comfort of air-conditioned Pullman cars parked on a siding adjacent to the Speedway for dining and living facilities.

Meeting also with the Indiana Section governing board while in the Hoosier capital, Chairman Teetor saw arrangements completed for a striking international dinner, with the Indiana Section as hosts, to be held at the Columbia Club the night before the race.

Sessions with R. N. Janeway, Detroit Section chairman, and SAE Vice-President-elect W. B. Hurley of the Production Activity, yielded a brilliant program of Detroit events for the Congress. The Detroit Section will be host to the Congress at an international dinner on June 1, and one of the most important automotive executives in the world will be the chief speaker.

Other phases of the Detroit Congress program have been developed by the Production Activity and include plant inspection trips during the three-day visit of the delegates to the Motor City. Trips to Greenfield Village, the Ford River Rouge plant, the Plymouth factory, the Highland Park plant of the Chrysler Corp., and the General Motors Proving Ground are already scheduled.

Chairman Teetor has been in touch also with the officers of the Metropolitan and Northern California Sections where the main technical sessions of the meeting will be held at the beginning and end of the Congress.

Never before has the SAE undertaken a meeting of such international scope with the Society as host to the world's leading authorities in automotive engineering and science. Early responses from this country and abroad indicate universal interest. Fourteen nations and 34 technical societies have been officially invited and specific reservations already are being recorded.

America's two great fairs – the New York World's Fair and the Golden Gate Exposition in San Francisco – are welcoming SAE Congress visitors by setting aside special days for them. May 24 is "Automotive Engineering Congress Day" at the New York Fair and the week in which the Congress meets in San Francisco will be known as "Society of Automotive Engineers' Week" at the Golden Gate Exposition.

Special attention is being given to transportation. Air conditioned Pullman cars will carry members of the Congress from New York to Indianapolis and will serve as their hotel for the night before the race. The next day the train will carry the visitors to Detroit, where members of the Congress will have accommodations in hotels. From Detroit special arrangements have been made for the overnight trip to Chicago where a streamlined diesel-electric train will be boarded for Los Angeles. After a brief stop for sightseeing in that city, members of the Congress will be taken for a scenic trip to Bakersfield by bus. There they will board another streamlined train for San Francisco. After the Congress closes the members will have an opportunity to select their own routes for the return trip.

Field Editors

Baltimore – N. L. Dods
Buffalo – C. W. Georgi
Canadian – Warren B. Hastings
Chicago – Austin W. Stromberg
Cleveland – W. A. Maynard
Dayton – R. H. Henry
Detroit – William F. Sherman
Indiana – Harlow Hyde
Kansas City – No Appointment
Metropolitan – Grosvenor Hotchkiss
Milwaukee – L. M. Kanters
New England – J. T. Sullivan
No. California – R. W. Goodale
Northwest – R. J. Hutchinson
Oregon – Sid Hammond
Philadelphia – H. E. Blank, Jr.
Pittsburgh – Murray Fahnestock
St. Louis—A. R. Burgess
So. California. – W. A. F. Millinger
So. New England – Edwin S. Sessions
Syracuse – C. T. Doman
Washington – P. R. Wheeler

Make Plans for World Congress

Following the conference at which National Meetings Committee Chairman Ralph R. Teetor, T. E. (Pop) Myers of the Indianapolis Motor Speedway and Indiana Section Secretary Harlow Hyde made final arrangements for the SAE World Automotive Engineering Congress to view the Annual 500-Mile Indianapolis Sweepstakes, May 30, and to participate in special race events.

Comfort and Cost Basic Bus Operating Problems

● **Northwest**

The modern operator of a large bus fleet is faced with two basic problems – low cents-per-mile operating cost and passenger comfort, T. C Howe, superintendent of equipment, North Coast Transportation Co., Seattle, told members and guests attending the Northwest Section's Nov. 18 meeting. He was introduced by Section Chairman Harley W. Drake.

In his paper, "Bus Maintenance Problems and Practices," which he also presented before the West Coast Transportation and Maintenance Meeting at Los Angeles earlier in the month, Mr. Howe said that it is almost axiomatic that low-cost maintenance can best be obtained by complete standardization of motors, other running gear, and chassis parts. "This happy situation," he noted, "is not the lot of us average operators, and we are faced with the problem of servicing and maintaining numerous different types and makes of units."

The author pointed out, that while the main-

tenance man is concerned with cost per bus mile, the operating man is interested in cost per seat mile—and the solution of his problem has been a large factor in shaping the design of the modern bus. "Generally speaking," he said, "the average operating man wants to get the greatest number of seats inside a given body with the lowest possible weight. . . . Fortunately or unfortunately, our bus passenger of today has exacting ideas of personal comfort and our State regulatory bodies have certain definite ideas about physical dimensions and weights of vehicles. For these reasons the operating man has had to resign himself to adopting certain minimum standards of seat spacing and conform to certain maximum limits of vehicle dimension," he continued.

Mr. Howe explained that within his company it is not considered good practice to have less than 33-in. seat spacing in short-haul buses, nor less than 36 in. in long-haul buses.

The additional payload carrying possibilities of the transit or "hoodless" type of bus has appealed so strongly to fleet operators, Mr. Howe stated, that even the smaller buses are now available in this design. So complete has been the swing to this type, he continued, that some of the larger manufacturers no longer show the old-style conventional bus in their standard lines.

After his general discussion of the problems facing bus operators, the speaker turned to the mechanical side of the question and explained methods of maintenance and inspection used by his company.

Among those answering the call for discussion of Mr. Howe's paper were C. H. Bolin, W. W. Churchill, and Murray Aitken.

80% of Cars Reported Below Peak Efficiency

● New England

Using a portable chassis dynamometer at the New England Section's Dec. 13 meeting, Richard J. Coveney, director of the Ethyl Gasoline Corp.'s Boston Motor Clinic, demonstrated the method by which, he said, it has been determined that four out of five cars in use today fail to deliver all of the performance and economy built into them at the factory because of improper motor adjustment and fuel selection. The dynamometer, he noted, reveals hidden maladjustments in motors just as the X-ray shows human maladies.

Continuing, Mr. Coveney said that 80% of the cars in operation are "tuned down" so that they will run without knocking on the lower grade fuels, ofttimes at a loss of power. He stated that both the motor and the oil industries indorse motor-clinic programs as a progressive step in training their representatives throughout the country to better serve the motorists.

Section Chairman John W. Lane presided at the meeting which was held at the Boston Motor Clinic.

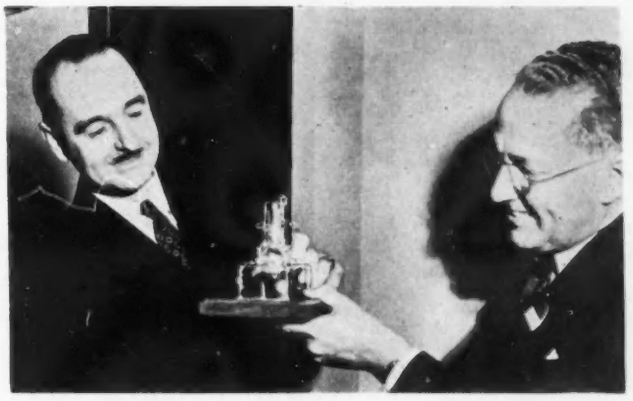
Dean A. Fales, associate professor of automotive engineering, Massachusetts Institute of Technology, presented his annual talk on the new models before the New England Section's Nov. 22 meeting.

Prof. Fales believes that the 1939 models will start many trends, particularly in the direction of lower and wider bodies, elimination of running boards, larger window area, and simplified clutches. He dislikes the tendency to set headlights in fenders, because in that position they are more susceptible to being thrown out of focus by accidents and by the gathering of ice and mud under the fender.

The three factors that most need attention from the viewpoint of safety, were listed by the speaker as vision, ventilation, and seating position.

It Is a Glass 2-Cycle Diesel Engine

When F. G. Shoemaker, *right*, completed his talk on 2-cycle diesel engines at the Northern California Section's Dec. 6 meeting, Chairman G. L. Neely on behalf of the Section presented him with a miniature 2-cycle engine in glass – complete with piston, connecting rod, crankcase, flywheel, double ports and all of the working parts necessary for operation.



Tells How GM Met Some 2-Cycle Diesel Problems

● No. California

A welcome from a record crowd of more than 300 members and guests greeted F. G. Shoemaker at the Dec. 6 meeting of the Northern California Section. Mr. Shoemaker, who is chief engineer of the Detroit Diesel Engine Division of General Motors Corp., made a special trip to the Coast to present his paper on 2-cycle diesel engines.

The need for a compact light-weight diesel engine which could be produced by methods similar to those used for automobile engines, resulted in the decision of General Motors to adopt the 2-cycle principle, Mr. Shoemaker stated. He had previously recalled that research on diesel engines started in the General Motors Research Laboratory ten years ago under the direction of C. F. Kettering, vice-president in charge of research.

In explaining how some of the problems have been met, he said that scavenging is accomplished by the use of an external blower; blower noises are overcome by use of a spiral-vein Roots blower; piston cooling is done by a jet of oil being sprayed on the underside of the crown; and injection troubles are minimized by the use of a fuel pump and injection-valve unit for each cylinder where pressure of 20,000 lb is applied at the nozzle.

Mr. Shoemaker pointed out that all parts are interchangeable so that, with minimum alteration, the engine can be adapted to eight different combinations, such as: clockwise or counter-clockwise rotation, auxiliaries on the port or starboard side, and power take-off on either end.

The successful adaptation of the 2-cycle principle, he said, has contributed much to the development of the automotive diesel engine which is now the solution to so many power problems.

The talk was illustrated by slides and was followed by a sound moving picture covering the development of 2-cycle diesel engines and their application.

Useless Gadgets Going Declares Austin Wolf

● Cleveland

When Austin M. Wolf, consulting engineer, commented on "Trends in 1939 Designs" before the Dec. 12 meeting of the Cleveland Section, lively discussion resulted that was only terminated when Mr. Wolf had to rush away to catch his train. Attendance smashed all records for the year.

Mr. Wolf commended the general trend toward doing away with the useless gadgets and ornaments which have been hung about the cars in the past. He noted a marked advance in suspension – but declared that there is still opportunity for major improvement. Running boards, he said, are going out of the picture, but will not disappear completely for two or three years.

Referring to the safety qualities of the new cars, Mr. Wolf remarked that better visibility is one of the very definite and marked characteristics of the 1939 designs.

The rather general adoption of changes in the operation of transmissions indicates a trend away from the up-to-now conventional design, he said, adding that no individual system has sufficiently outstanding merit to classify any particular design as a definite trend.

Predicts 25% Increase In 1939 Car Production

● Pittsburgh

A minimum of 25% increase in automobile production next year was predicted by Norman G. Shidle, editor of the SAE Journal, in his talk before the Pittsburgh Section, Dec. 13. He expressed particular optimism about the outlook because of the basic progress being made by automotive factories in labor relationships.

"Executives are actively trying to find ways to meet the social responsibilities which the automobile industry has to face and at the same time preserve the vitalizing influences which spring only from free enterprise, free competition and freedom of action for every element in the business – workers, dealers and manufacturers," he declared.

The discoveries of pure science will be put to work in the automobile industry in many new ways during the next ten years, Mr. Shidle prophesied. "With the rapid development of discovery in the realm of pure science," he said, "nobody can even guess intelligently about the distant future of automobile design – not even about the materials of which the automobile of the far future may be made. Already something like 300 different kinds of raw materials are used in the manufacture of the modern automobile."

Mentioning specific design features, he predicted that running boards would be extinct on automobiles a few years hence, that the inside of automobile bodies would more and more reflect the atmosphere of a small living room and that continued improvement in headlights is certain.

Glare control is not the only important problem in headlighting, he emphasized. Inability to see because of inadequate illumination, he said, is at least as important – if not a more important, factor in the night accident situation. "Impressive advances have been made steadily in headlighting throughout the last 20 years," he said, "until today the modern head-

lamp is recognized among illuminating engineers as just about the most precisely made piece of equipment in large scale production."

Cold-Weather Lubrication

Just before old man winter arrived in the Pittsburgh area, some 175 members and guests heard Dr. M. J. Zucrow, of Spitzglass & Zucrow, consulting engineers, speak on "Engine Lubrication Under Cold Weather Conditions," at the Pittsburgh Section's Nov. 15 meeting.

Deposition of water in the crankcase probably causes more difficulty than all other results of cold weather operations, Dr. Zucrow stated. Apart from leaks in the water jacket, the largest potential source of water is the moisture in the combustion gases, he said, noting that for every gallon of gasoline burned approximately 1⅛ gal of water vapor are formed. Although most of this escapes through the exhaust valve, he explained, some of the condensed water leaks into the crankcase, mixes with the lubricating oil and, together with the foreign materials which are present, forms an emulsion having a semi-solid consistency that is called "emulsion sludge."

"It appears," he said, "that the sludge formation, when once started, is what might be termed 'autocatalytic' and if the crankcase is not cleaned thoroughly after it has been drained, the sludging may reappear in a very short time. If permitted to accumulate for an appreciable period, emulsion sludge will promote the corrosion of the highly polished surfaces of the engine. Furthermore, the finely dispersed water particles in the sludge may freeze in the lubricating passages and stop circulation. . . .

"Another difficulty which may accompany water accumulation is abnormal wear of cylinder bores due to corrosion," Dr. Zucrow continued. "This is not due primarily to the water, but to the operation of the engine with its cylinder walls at too low a temperature," he said, and pointed out that while the action of sulfur and water may contribute in some measure to cylinder-bore wear, as is generally believed, more recent investigations by the Institution of Automobile Engineers indicate that the principal cause of corrosive wear is the action of carbonic acid formed by the carbon dioxide and water vapor produced by combustion of the fuel.

Dr. Zucrow advocates combating water deposition by thoroughly checking for block leaks, and if water appears after these have been eliminated, by taking steps to put crankcase ventilators and air cleaners in good condition. He also urged that means should be taken to raise the temperature of the jacket water and the air surrounding the engine, noting that thermostatically controlled radiator shutters will be of material benefit in this connection. In extreme cases the speaker advises covering the crankcase to take away some of the draft and, if blowby is excessive, replacing valves, valve guides and piston rings. If the above remedies fail, he added, drain periods must be shortened.

Continuing, Dr. Zucrow touched upon oil dilution, starting difficulties, engine warm-up and other cold-weather problems. He also devoted some time to the selection of lubricants, stating in this connection, "The most discouraging aspect of engine lubrication is the lack of simple tests or of significant criteria for judging oil quality."

During the discussion, which was presided over by Charles R. Noll, Gulf Oil Corp., Dr. Zucrow was asked about the trend toward using lighter oils. It is his belief, he replied, that this tendency has gone a little too far, and that there is now a tendency to use oils slightly heavier than the very light ones recommended at one time. Light oils, he continued, work fine in the newer engines which have been designed for them, but in many cases heavier oils give better results in older engines.

B. H. Eaton, Bell Telephone Co. of Pa., mentioned that in vehicles which average but 12 miles a day, a cupful of water can accumulate in a week under some conditions. This is particularly true if the driver has a tendency to overuse the choke, he said.

Oil filters were discussed by C. J. Livingstone, Mellon Institute, who explained that they do not remove the solubles which are the lacquer-forming ingredients in dirty oils.

Further discussion was participated in by Ralph Cohn, Pines Winterfront Co.; Richard Welker, Gulf Oil Corp.; Murray Fahnestock, *Ford Dealer & Service Field;* Ralph Baggaley, Jr., McCrady-Rodgers Co.; John M. Orr, Equitable Auto Co., and others.

Favors Supercharging For Increasing Output

● Metropolitan

Great interest in H. C. Tsien's paper, "Basic Problems in Design of High-Output Aircraft Engines," presented before the Metropolitan Section's Dec. 1 meeting by Y. T. Li, was reflected in the prolonged discussion which followed the presentation. The author, a well-known aeronautical engineer, is a member of the National Resources Commission of China. He is a graduate of the Massachusetts Institute of Technology and of the Chiao-Tung University of China.

The program opened with motion pictures and a talk by SAE Secretary and General Manager John A. C. Warner outlining plans for the Society's 1939 World Automotive Engineering Congress. Among the 350 attending were representatives from many of the leading aircraft and petroleum companies in the East.

Mr. Tsien, in his paper, first analyzed the factors governing theoretical engine output. Difficulties that the designer must overcome in order to use any one of these factors without paying too much in weight and space, are stress, heat dissipation, piston speed and detonation, he said.

Supercharging, continued Mr. Tsien, is the most promising method of boosting output, while increase in compression ratio is not at all economical for ultra-power. The author named piston speed as the output-limiting factor least susceptible to improvement.

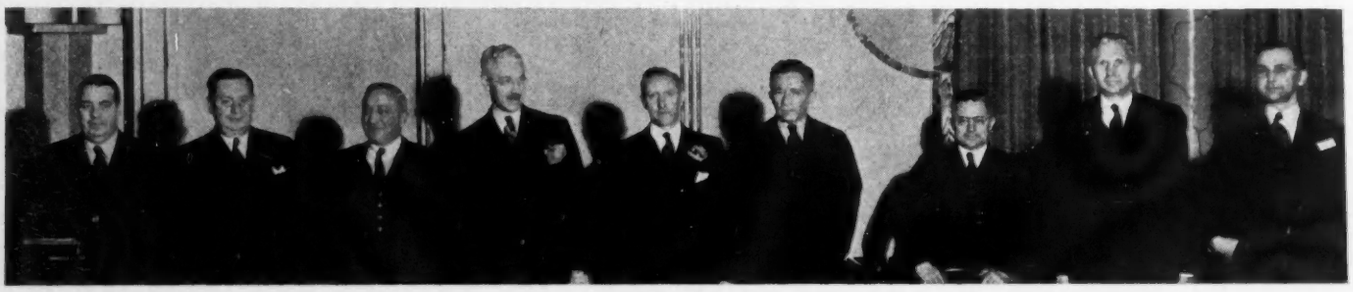
To meet the stress problem, cold-working of metals was proposed by Mr. Tsien. Wing surface radiators were suggested, together with injection of cooling liquid and detonation inhibitors into cylinders. To avoid excessive detonation, after-cooling is absolutely necessary, he said. Automatic spark control varying with intake pressure, is favored by the author to keep maximum pressure constant.

Headtableites at the Canadian Section's December Meeting

Well over 100 members and guests of the Canadian Section turned out to welcome SAE President C. W. Spicer and John A. C. Warner, secretary and general manager, at the Dec. 14 meeting. Both Dr. Spicer and Mr. Warner spoke. C. E. Tilston, chairman of the Section, presided.

At the speakers' table were, *top*, Alex Gray, Charles K. Edward, J. C. Armer, W. Eric Harris, Col. F. F. Worthington, George Garner, R. H. Combs, Dr. Spicer, and Mr. Tilston.

***Below*, Mr. Warner, W. E. McGraw, Neil Petersen, Warren B. Hastings, Frank Oliver, J. L. Stewart, Adam F. Smith, Marcus L. Brown, and W. A. Wecker.**



Utilization of energy from exhaust gas is strongly advised by Mr. Tsien whose conclusions are: 1. Aircraft engines of much higher output than at present achieved may be designed by adopting considerably higher intake pressure rather than higher compression ratio; 2. Design alterations permitting high output are necessary in order to remove the limits imposed by too high piston speed, insufficient heat transfer, severe detonation, and high stress; 3. Effective means available are injection of anti-detonating and cooling liquids, use of valve overlap, and spark control; 4. Recovery of energy from exhaust gas will be of growing importance as the intake pressure and, therefore, the engine output are increased.

Don't get too excited about power output figures obtained by "trick" means, cautioned Arthur Nutt, engineering vice-president of Wright Aeronautical Corp., in commenting on the paper.

Sound developments come from basic research including careful analysis of complete ship design, said Mr. Nutt, adding, "The development of any new engine, or any attempt to increase bmep should be done in an orderly manner . . . Any radical developments should be tackled only through basic research and then, after the facts are known, the complete engine design is possible; otherwise the venture may become too costly and may result in failure."

Col. H. W. Harms, who represented the Air Corps, stated in discussion that for present military aircraft where superior performance resulting from increased horsepower is more important than reduction in fuel consumption, the entire trend has been toward higher brake mean effective pressure which results from increased intake pressure.

"In the past ten years the Air Corps has probably done more to encourage the mechanical injection of fuel than any other agency," he stated. "This has resulted in the decided improvement in modern aircraft carburetors and paves the way for injection of anti-detonating and cooling liquids, if and when such materials are available." He continued, "Further work on spark advance for high specific outputs will be conducted, but there is a feeling that spark plugs will probably not withstand the high operating temperatures which will be encountered with the late burning and greater amount of heat rejected to the exhaust.

"As the first step towards the recovery of waste energy in the exhaust gas, the exhaust turbine which has been under continuous development by the Air Corps since 1917 is probably the most promising means of recovering a portion of this waste energy. As the power output of the engine increases, the metallurgical problem of obtaining satisfactory materials for very high temperatures and high stresses increases. Research on improved materials has been sponsored by the Air Corps for many years and the subject is still being studied."

According to N. N. Tilley, chief engineer for Continental Motors at Detroit, "Over a period of years it is to be noted that permissible piston speeds have increased greatly. It can be expected that ways and means will be developed for further increase of piston speeds, but at considerable expense, by the time-tested procedure of repeated tests, corrections and improvements in processing, design and materials."

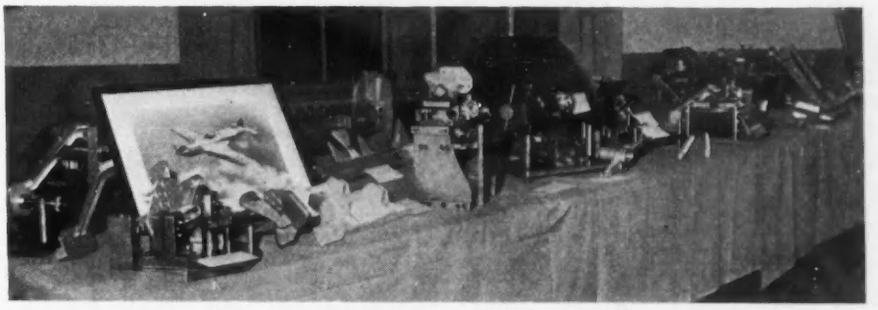
He also noted, "Injection of fuel under considerable pressure offers possibilities of efficient carburetion of a larger range of fuels and better cyclic efficiency for the four-stroke-cycle engine. Also scavenging of two-stroke-cycle engines, whether spark or compression ignition, is not a simple process. The few successful instances deserve special study."

A. T. Gregory, chief engineer of Ranger Engineering Corp., said the part played by instrument development as an aid to high output engine development should not be overlooked. "As it becomes possible to measure what goes into the engine and also what goes on inside of it during operation, it becomes increasingly possible for the designer to specify how the engine should be built and operated."

Commenting on the author's statement that synthetic fuels introduce new difficulties, R. F. Gagg of the Wright Aeronautical Corp. remarked that he has observed very little difficulty thus far. "I also note," he added, "the author predicts a considerable increase in the use of fuel injection in aircraft engines. While I think we are all agreed as to the theoretical value of this system, it never seems to be adopted widely in practice."

Mr. Gagg also remarked, "In the author's consideration of various types of engine, I believe, his conclusions are somewhat colored by a desire to achieve the ultimate in regard to low weight and high output at a considerable sacrifice to the airplane owner's interest in problems of installation and maintenance."

Buffalo Has Active Aircraft Meeting



More than 400 members and guests of the Buffalo Section attended the Nov. 15 Aircraft Meeting of the Section. *Above*, a portion of the exhibit of tools and parts.

***Below*, Speakers Don R. Berlin, John Lee, Peter F. Rossmann, and Section Secretary C. W. Georgi.**

Sees Aircraft Industry Able to Meet Emergency

● Buffalo

"The efforts put forth by our aircraft manufacturers in seeking a greater degree of efficiency in their plans to meet production demands, will enable this country to undertake large-scale production overnight, should the need arise for either commercial or military use," Don R. Berlin, chief engineer of the Curtiss Aeroplane Division of Curtiss-Wright Corp., declared in presenting the first of three papers presented at the Buffalo Section's Nov. 15 meeting. Elwood Larkin introduced the speakers to the 400 members and guests in the audience.

Continuing, Mr. Berlin, who has had 18 years experience in designing military airplanes, compared production methods of some years ago with those of today and explained how the development and use of special tools have led to quantity production permitting interchangeability of parts.

Answering the question as to why production methods and practices of the automotive industry are not more extensively used in the manufacture of aircraft, the second speaker, Peter F. Rossman, production design engineer of the Curtiss Aeroplane Division, pointed to the differences in what constitutes mass production in each field. While the production of 300 automobiles of the same kind in one day is not unusual, the production of 300 airplanes of one type in one year would be outstanding, he explained.

Continuing, he said, "Special and single purpose machine tooling and extensive conveyor systems are very necessary in the production of 100,000 cars where in certain details, such as bolts and lockwashers, the cost of 1/100 part of a cent becomes important. In aircraft construction the application of such refinements obviously cannot be as extensive."

Some of the automobile manufacturing practices that can be employed by aircraft manufacturers are, "designing to eliminate hand work and the complexity of fabrication and assembly; coin pressing forgings and castings to eliminate machining; utilizing the normal cast surfaces instead of spot facing and machining of pads and joint surfaces; designing the experimental airplane as a production article; strict observance of standards; complete, accurate, and clear drawings to insure interchangeability of parts which sometimes must be obtained from different vendors."

John Lee, chief tool designer, Curtiss Aeroplane Division, stressed the principle that in aircraft production "the plan in tooling is first, for accuracy and interchangeability, and, second, for economical production." He then explained, in detail, the method of tooling for the production of a modern monocoque airplane.

A large number of tools and parts were exhibited and used by the speakers in illustrating their papers. Many slides were also used.

Through the courtesy of the Aluminum Co. of America, the motion pictures, "Aluminum—Mine to Metal," and "Aluminum Fabrication Processes," were shown, to complete the program.

Clayden and Neely Spur Discussers to Action

● Philadelphia

British-born Ludlow Clayden and engineer-humorist George L. Neely, from the Pacific Coast, brought much joy and information to the 125 members and guests of the Philadelphia Section who attended the November meeting. This capable team spoke warily, but thoroughly on the subject "Oil, Bearings and Pistons," and met heavy cross-examination from an aroused audience with many clean-cut answers and some neat feints.

Mr. Clayden has been active in SAE committee work since 1917. At the present time he is a member of the oils division of the Extreme-Pressure Lubricants Research Committee and the lubricants division of the Standards Committee. His company affiliation is Sun Oil; his title, experimental engineer. The Standard Oil Co. of California claims the talents of Mr. Neely who serves on five SAE committees and is chairman of the Northern California Section.

Frankly admitting that much of what he would say in his talk would be nothing new to men in his field, Mr. Clayden pointed out in his early remarks that "There is no ideal engine oil and it appears unlikely that there ever can be." He mentioned some of the things which might be required of an ideal oil. First, he said, it should change in viscosity with piston clearance; second, it should change in viscosity with engine speed; third, it should be completely incombustible as long as it is on the cylinder walls; fourth, it should burn completely, leaving not a trace behind as soon as it enters the combustion chamber.

"Naturally," he said, "such extremely contradictory ideals leave room for a great latitude of opinion as to the best compromise, and obviously the compromise best for one set of conditions is not at all likely to be the compromise best for a different set."

This speaker maintained that designing an oil is just as important a problem as designing parts for the engine. "You can't run an engine without a crankshaft, nor can you run one without oil," he said. Because of the tremendous width of varying conditions which may be encountered by an engine in service, various compromises in the design of the oil must be effected.

Dwelling on the need for compromise, Mr. Clayden stressed the paradox that out of crude oil we try to make gasoline to burn as thoroughly as possible and lubricating oil to resist burning.

Mr. Neely added to Mr. Clayden's discussion with some comments on compounded lubricants and the nebulous term "oiliness." With regard to oiliness he remarked that it is a *joint* property of the lubricant and the materials with which that lubricant is used.

Mr. Neely concentrated his remarks on a description of the advantages of the "Feritex" process of treating frictional surfaces. The process, designed to reduce scuffing and welding during the break-in period, is a chemical surface treatment. It comprises a liquid bath in which parts are immersed in a solution and by means of which several micro-constituents of the metal are removed electrically. The solution does not affect heat treatment.

Discussion Active

Paul S. Lane, metallurgical research engineer, American Hammered Piston Ring Division, Koppers Co., was one of the first in the audience to take part in discussion. Mr. Lane told the group that his company had been investigating for some time the possibilities of surface treatment. He advanced the view that surface treatment acts as a gasket between the ring and the cylinder. He made the point that it is easily possible to abuse cars so that the beneficial effects of surface treatment will not be derived. Mr. Lane also stressed the importance for the oil to wet, that is, to lay on the surface. "Another aspect of the problem," he said, "is that while the manufacturer of vehicles may recommend use of certain oils in their cars, they really don't have much control over the type of oil actually going into the engine." A frequent question asked of him, he admitted, is "How long does surface treatment last?" Naturally different conditions of operation will affect the service life of the surface treatment. However, according to Mr. Lane, the first hour is the critical hour. The benefits accruing in this initial break-in period may have long-lasting results.

B. B. Bachman, vice-president in charge of engineering, Autocar Co., mentioned the value of the lubricant as a coolant. "With the tremendous advance made by various methods for finishing," said Mr. Bachman, "we never yet have been able to obtain a surface finish from a machine operation which is developed by surface friction in the presence of the proper lubricant." Mr. Bachman concluded that he would hate to have to define "What careful breaking-in is."

Fred L. Faulkner, T & M vice-president of the SAE and manager of the automotive department, Armour & Co., took time out in the technical discussion to voice his pleasure in the good work being done by the Philadelphia Section in encouraging and stimulating the interest of local engineering colleges in the Society's activities. Every month during the year 1938-1939, this Section is inviting a group of students from each of these schools. Present at the November meeting were about 25 young men from the engineering group at Haverford College.

High 'No-Attention' Mileage Predicted

● Detroit

Engines that will require no attention – not even adjustments – for periods upward of 25,000 miles were predicted to 450 members of the Detroit Section at its Dec. 5 meeting, by Alex Taub, internationally known engine designer. He also predicted that the ever-increasing tax load which falls heavily on gasoline users will soon force American engineers to build more miles-per-gallon into automobiles.

After more than 12 years as engine-design chief for Chevrolet, Mr. Taub now is leading a research program for Vauxhall Motors, Ltd., in England. Last year, he said, the entire British motor car industry "went after the fuel consumption problem" and added 20 to 30% to the average gasoline mileage in cars rated at 10, 12, 14 and 25 hp, the latter being approximately equivalent to American cars like the Ford, Chevrolet and Plymouth.

Modern styling has made engines inaccessible for adjustments, Mr. Taub asserted. The fact that it is buried in "tin lace" makes it "sharply necessary to improve the engine as it is now located and in its present form," he said.

"Obviously a distinct benefit would be an engine that did not require attention for the maximum number of miles per year – say – 25,000 miles," was Taub's leading statement for a discussion which criticized all vital engine accessories – ignition, lubrication, spark plugs and carburetors.

Critical of the appearance of today's cars, Mr. Taub declared that stylists, to date, have given insufficient consideration to vision, frame sag on washboard roads, and wind noise.

"I believe we shall all have to do much better on fuel consumption than we are doing today," Mr. Taub told his audience. "The governments of the world are seeking more and more revenues. The automobile industry has of necessity paid its share into the treasury. Today in France the fuel tax is large enough to eliminate a license tax. In England, in spite of the horsepower tax (Chevrolet, Ford or Plymouth paying around $120 a year license tax), a tax on gasoline of 16¢ per gal prevails. A fuel tax exists in more or less degree all over the world.

"Government officials in countries wherein a heavy tax on fuel exists have maintained that this is a fair tax because it will challenge ingenuity and that the cost of individual operation will not be increased because increased miles per gallon will be built into cars. . . . The law of diminishing returns does not come into the picture just so long as more and more cars go into use and the old ones keep going."

Declaring that engine refinements to increase gasoline economy had not been so keenly necessary here as in Europe, Mr. Taub predicted that the time is "near at hand." He said, "it must be so, because the gentlemen in the Treasury Department are extremely observant and will recognize the fact that American ingenuity in fuel exploitation has not even begun and when it does, it will, as usual, lead the world."

Dreyfuss and Wolf Speak

The current habit of following fads in designs, making all cars look alike, was assailed with vim and vigor at the Nov. 14 meeting of the Detroit Section. Austin M. Wolf, internationally known engineering consultant, and Henry Dreyfuss, famous for his industrial designs, were the two speakers. The meeting was closed to all but SAE members.

Mr. Wolf was in fine fettle and SAE'ers know what that means. His review of 1939 design trends was a presentation unhampered by any commercial influences. Mr. Wolf showed a series of lantern slide pictures to illustrate his comments, which took in every car in the field, and discussed each in the light of the four predominant characteristics of the changes made in the new models – safety, comfort, economy and styling. He was highly complimentary to the safety improvements designed into 1939 cars.

Mr. Dreyfuss, whose subject was "Art on Wheels," led a discussion of styling, expressing his belief that, for the most part, functionalism has not yet been attained in automotive design. He criticized the sameness of appearance of each year's new cars. On the subject of running boards, there was a lively discussion from the floor, summed up in the statement: "If you are ashamed of running boards, take them off, or cover them up; but if they really have a use, a function, begone with the fad of amputating them."

Those who succumbed to the allure of the New York and Chicago Shows – or hunting in Michigan's snowless north – not only missed a treat, but maybe some significant suggestions. For there were many body engineers telling chassis men "how to do it" and the chassis group retaliated in kind. Attendance was over the 200 mark, with 121 at the dinner itself.

Cold-Weather Operating Difficulties Analyzed

● Milwaukee

As old man winter more and more makes himself felt, fleet operators are growing more and more interested in "Engine Operation in Cold Weather." That timely topic was the subject of Dr. Maurice J. Zucrow, of Spitzglass & Zucrow, consulting engineers, when he spoke before the Dec. 9 meeting of the Milwaukee Section.

More than 150 members and guests were on hand to hear Dr. Zucrow analyze the problem on the basis of lubrication, crankcase dilution, water-temperature control, oil-temperature control, and under-hood-temperature control.

During the discussion period Ralph F. Cohn, general manager of Fines Winterfront Co., was called upon to give a short talk describing the design and operation of his company's products.

Radical Design Shifts Shown in New-Car Study

● **Indiana**

Summing up the new cars in his talk before the Indiana Section's Dec. 8 meeting, Joseph Geschelin, Detroit technical editor, *Automotive Industries,* noted that styling and eye appeal are so arresting that many engineers look at 1939 as a "Body" year. However, he continued, "Don't let eye appeal obscure the fact that the new cars embody some radical shifts in design . . . shifts that represent more substantial changes than the industry has seen in almost ten years." These he grouped under the major headings of: 1. Styling; 2. Improvements in riding comfort through basic changes in suspension; 3. First basic changes in clutch design in many years; and, 4. Basic changes in transmissions and transmission control. Then, using slides, Mr. Geschelin pointed out the forward steps taken by the individual car makers.

An added feature at the meeting was the presentation, by John A. C. Warner, SAE secretary and general manager, of colored moving pictures previewing the SAE World Automotive Engineering Congress, which opens in New York, May 22, and concludes in San Francisco, June 8.

Indianapolis will be host to the Congress over Memorial Day. The visitors will attend the annual 500-mile race and will be guests of the Indiana Section at a banquet the evening before the race. Plans for the Congress were discussed by Past-President Ralph R. Teetor, Chairman of the National Meetings Committee, and Mr. Warner. Representatives of the Indiana and Indianapolis Chambers of Commerce attended the meeting and promised their support in helping the Section make the visit of the Congress an occasion of true Hoosier hospitality.

Technical Session Has Three-Paper Program

● **St. Louis**

With Burns Dick, chief engineer, automotive engineering division, Wagner Electric Corp.; I. E. Coffee, Carter Carburetor Corp.; and a paper by A. J. Mummert, chief engineer of McQuay-Norris Mfg. Co., on the program, 100 members and guests of the St. Louis Section were treated to a well-rounded technical session on Nov. 30. An added attraction was the showing of "The Story of the Diesel," a motion picture, followed with comments by Section Chairman Adam Ebinger and a representative of the General Motors Corp.

The latest developments in power and hydraulic brakes, particularly for commercial vehicles in classifications ranging from 10,000 to 40,000 lb, were reviewed by Mr. Dick. He spoke particularly of a Lockheed hydraulic brake which has in effect two primary shoes and which is not subject to fading in reverse. The former feature, he explained, makes possible more uniform unit pressures between lining and drums with consequent longer life and more satisfactory service than has hitherto been available with servo-action brakes.

The Carter Carstarter, as used on the Buick "40", eliminates the starting pedal and gives greater ease and simplicity of driving operations, were Mr. Coffee's claims for this device. He explained that essentially it consists of a switch mounted on the carburetor which is closed by depressing the throttle. This switch operates a relay which in turn actuates a solenoid causing the starter pinion to engage and turn the flywheel, he said, further explaining that a ball check is incorporated in the Carstarter mechanism which is held in such a position by the manifold vacuum depression that it is impossible to engage the starting gear while the motor is running.

Mr. Mummert's paper was read by B. A. Yates, of the same company. It dealt with

S·A·E Student Branches

NEW YORK UNIVERSITY

The Bliss Building (*Engineering*)

Data supplied by James R. Chapman, 1937-1938 secretary of the SAE Student Branch at New York University.

AT New York University members of the SAE Student Branch meet informally throughout the school year to hear men with practical experience discuss technical phases of the automobile, aircraft and diesel-engine industries. These authorities also tell the students of opportunities for young men entering these fields. After their talks the speakers reply to questions asked by the students.

Student Branch members are active on the campus. They take a prominent part in the program of the University's Engineering Demonstration Day, acting as guides and staging demonstrations for members of high-school graduating classes who are guests of the University on that occasion.

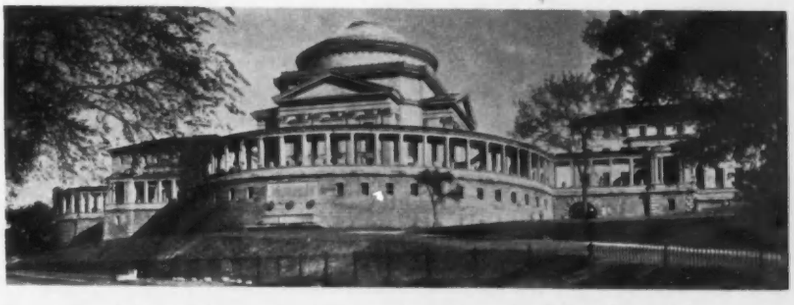
The Metropolitan Section of the Society opens its meetings to members of the Student Branch and, upon occasions, invites them to participate in its special activities. Last year the students cooperated in the Section's tests of new-model passenger cars at the Roosevelt Raceway on Long Island.

Although originally granted its charter in 1929 the N. Y. U. Student Branch did not become active until 1932. Since then it has developed into one of the larger Student Branches and has become increasingly important on the campus.

New York University provides educational opportunities for more than 30,000 students located on its several campuses. The College of Engineering is one of the oldest in the country and one of the largest in the eastern states. When the University was founded in 1832, the first faculty included Major David Bates Douglass as professor of civil engineering and architecture. After the first year engineering instruction was abandoned to be revived in 1854. Aeronautical engineering, chemical engineering, civil engineering, electrical engineering and mechanical engineering are the five undergraduate engineering courses leading to degrees. Graduate courses are offered in aeronautical engineering, applied meteorology, chemical engineering and civil engineering.

The Daniel Guggenheim School

(*Continued on page* 26)



The Hall of Fame is located on the University Heights Campus

the metallurgical aspects of pistons and piston rings. Differences in wear between several ring and piston materials which had been operated under identical conditions were shown by slides. Photo-micrographs were used to demonstrate that ring materials composed of a relatively soft ferrite act as a bond for much harder plates of iron and magnesium carbide.

Geschelin Comments On 1939 Automobiles

● Syracuse

Joseph Geschelin, Detroit technical editor, *Automotive Industries,* was the guest speaker at the Nov. 21 meeting of the Syracuse Section. Commenting on the designs of 1939 cars, Mr. Geschelin developed his subject along lines similar to his earlier presentations before meetings of several other SAE Sections.

SAE Student Branches Elect Officers; Hold Active Meetings

● Ohio State

At a business meeting of the Student Branch at Ohio State University, Dec. 9, the following officers were elected for the winter quarter: W. E. Harpst, chairman; R. L. Anderson, vice-chairman; V. L. Iles, secretary; and R. L. Cooney, treasurer.

● U. of Oklahoma

Slides and motion pictures on the development of the diesel engine for streamlined trains, stationary industrial use, trucks, buses, and tractors, were shown before a joint meeting, Nov. 30, of SAE and ASME Student Branches at the University of Oklahoma by Carl A. Tangner, general manager of the Diesel Power Co. of Tulsa. More than 75 were present.

Mr. Tangner led the discussion which followed the showing of the pictures.

● M. I. T.

The SAE Student Branch at the Massachusetts Institute of Technology has an interesting program planned. It includes visits to the Ford assembly plant at Sommerville, Mass., the Stanley Steamer plant at Newtonville, Mass., and an automobile museum at Providence, R. I. Members of the Branch have made it a practice to attend monthly meetings of the New England Section as a group.

● U. of Detroit

At its first meeting of the year, held Nov. 17, some 30 members of the University of Detroit Student Branch heard Ernest E. Wilson, technical assistant to the director of the General Motors Proving Ground, and Detroit Section Chairman R. N. Janeway, head, dynamics research department, Chrysler Corp.

Mr. Janeway was the first speaker, taking as his subject, "Student Membership in the SAE." Mr. Wilson described activities at the GM Proving Grounds.

Student Member Edward E. Clark was presented with the Continental Motors Trophy, which is awarded yearly to the junior aeronautical engineering student submitting the best airplane design.

● G.M.I.

The SAE Student Branch at General Motors Institute heard Dr. E. H. Wallace of U. S. Rubber Products, Inc., at its first meeting of the year. Dr. Wallace spoke on processes used in the manufacture of rubber products and illustrated his talk with slides and motion pictures. He also used exhibits of rubber engine mountings, steering wheels, seat cushions and other items in making his points. About 30 members and guests were present.

On Dec. 6, Section A of the Student Branch visited the Chevrolet Grey Iron Foundry at Saginaw, Mich. About 35 members made the trip.

Officers of the branch are: C. Stallwood, chairman; F. Fishtahler, vice-chairman, Section A; Herbert Linabury, vice-chairman, Section B; K. E. Sihvonen, secretary-treasurer, Section A; and Roy T. Collins, secretary-treasurer, Section B.

New York University

(*Continued from page 25*)

of Aeronautics was established as a part of the N. Y. U. College of Engineering in 1925 through the generosity of the late Daniel Guggenheim who endowed the school of aeronautics with a gift of $500,000. Courses in industrial aviation and aeronautical engineering had been offered earlier under the department of mechanical engineering.

The College of Engineering shares the University Heights campus in uptown New York with the College of Arts and Pure Science. It overlooks the Harlem and Hudson Rivers and during the Revolutionary War was the site of a British fort. The Hall of Fame is also located on the University Heights campus.

SAE members serving on the College of Engineering faculty include: Prof. Alexander Klemin, chairman, department of aeronautical

Right this minute... the BENDIX DRIVE

is cranking thousands and thousands of cars in all parts of the world!

While you read this advertisement the Bendix Drive is working for motorists everywhere. It is cranking many thousands of cars the world over —quietly, efficiently, easily.

The universal acceptance of the Bendix Drive speaks volumes for its quality. In addition, it is adaptable to *every* type of starting control — floor button, clutch or accelerator pedal, dash button or, with Startix, completely automatic switch-key starting.

There is a Bendix Drive specially engineered for every size and type of automobile, marine or Diesel engine.

ECLIPSE
MACHINE DIVISION
BENDIX AVIATION CORPORATION
Elmira, New York

Student Paper Contests In Michigan; Northwest

"How Can the Present Automobile Be Improved?" Undergraduate engineering students attending Michigan colleges and universities will have an opportunity to answer this question by participating in the first Annual Student Paper Contest to be sponsored by the Detroit Section, according to an announcement by A. C. Hazard, chairman of the Section's Junior Student Activity.

First prize will be $50; second prize, $25; third and fourth prizes, one-year SAE memberships. The judges will be Carl Breer, executive engineer, Chrysler Corp.; John H. Hunt, director, new devices section, General Motors Corp.; and Ralph Upson, consulting engineer.

On the West Coast, SAE student members regularly enrolled in any school above high-school grade in Oregon and Washington have been invited to compete in a student paper contest for prizes donated by Harley W. Drake, chairman of the Northwest Section and a past-chairman of the Oregon Section.

The papers may deal with any engineering subject logically a part of SAE Activities.

Prizes of $60, $40, and $20, respectively, will be awarded student authors of the three papers selected as best by the judges.

---

engineering, and in charge of the aeronautical research laboratories; E. H. Hamilton, associate professor of automotive engineering and supervisor of mechanical laboratories; L. M. Porter, assistant professor of machine design, and J. G. Barrie, instructor in mechanical engineering.

Machine Shops Provide Indispensable Service

● Tulsa Group

How the modern automobile machine shop performs an indispensable service in the automotive maintenance field was explained to the SAE Tulsa Group at its Nov. 4 meeting by Joe Rhodes, Standard Parts Co., Tulsa, in his paper, "Machine Shop Practice in Reconditioning Automobile Equipment."

The machine shop, he pointed out, is usually connected with the local parts jobber and provides a machine shop service to repair shops and the smaller fleets which are unable to maintain the large amount of varied equipment necessary to efficiently fit a replacement part or recondition a motor.

He demonstrated some of the equipment found in up-to-date machine shops and stressed the necessity of employing machinists who not only know how to operate the equipment, but who also are familiar with the construction of such automotive units as the engine, clutch, transmission, and rear axle.

Reviews History Of Transportation

● Washington

There are three kinds of transportation – transportation of thought, of people, and of commodities, Walter A. Olen, president of the Four Wheel Drive Auto Co., said in opening his talk on "Modern Transportation" before the Washington Section's Dec. 13 meeting.

Tracing the history of each in America, Mr. Olen began with the days of the pony express, and told how one form of transportation succeeded the other until modern America is served by telephone, telegraph, and cable; automobiles, railroads, aircraft, and steamships – transporting thought, people and commodities.

Today, he said, one dollar will pay for the transportation of 1 ton of goods a distance of 4 to 10 miles by track-laying or wheeled tractors; 20 to 60 miles by truck; 100 miles by railroad; 750 miles by barges on rivers; 1000 to 1250 miles by barges on the Great Lakes; and 2000 miles on the open sea.

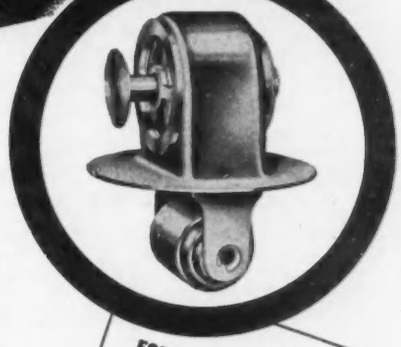
During discussion, when asked about the four-wheel-drive type of truck, Mr. Olen stated that while a four-wheel-drive unit costs about 15% more than the conventional two-wheel-drive type, it is estimated that there is a 10 to 15% saving in gasoline and a 10 to 20% saving on tires, plus a marked increase in ability and controllability. There is better than a 75% overall increase in efficiency for snow work, he added.

Mr. Olen told of strides being made by the four-wheel-drive truck in Germany where tests have shown that the controllability of this type of unit is far superior to either front-wheel or rear-wheel-drive vehicles.

The Washington Section had an unusual turnout at its Nov. 8 meeting to hear Austin M. Wolf, consulting engineer, discuss the new cars. His talk was profusely illustrated with pictures thrown on the screen with an opaque projector.

The paper presented by Mr. Wolf included many of the points made in his article, "Trends

Eliminates
STICKING • BINDING • FRICTION



● Functioning consistently under all possible conditions . . . balanced to control the circulation of water regardless of pump pressures . . . Dole double port poppet type thermostats offer this additional important advantage:

Due to a unique universal motion joint for connecting the thermostatic element *they cannot stick, bind or cause friction.* Write for complete engineering data and performance records under varying road, load and weather conditions.

FOR UNIFORM PERFORMANCE USE DOLE PRODUCTS

Dole Thermostatic Bi-Metal is known through the industry for accuracy and *reliability.* Dole Draft Deflectors are approved accessories for many cars. Dole Fittings, listed by Underwriters' Laboratories — Re-examination Service, range from compression couplings for all tubing connections to a complete assortment of hose line parts for hot water heaters.

DOLE
Thermostats
THE DOLE VALVE COMPANY • 1901-1941 Carroll Ave., Chicago, Ill.
Detroit Office: 2-137 General Motors Building

in Design of 1939 Cars," published in the Transactions Section of the November SAE Journal.

Bearing Materials Topic of Joint Meeting

● So. New England

What has happened and what is happening in the automotive bearing field was told the Southern New England Section, in joint meeting with the Hartford Chapter of the American Society for Metals, Dec. 13. The speaker was C. F. Smart, metallurgist, Pontiac Motor Division, GMC, who called upon years of experience in presenting his paper, "Bearing Materials, Manufacturing Practices and Failures." Mr. Smart used numerous slides in his presentation. L. A. Lanning, metallurgist, New Departure Division, GMC, was technical chairman.

Before the technical session, F. G. Hughes, general manager, New Departure, welcomed the guests and reviewed the industrial history of Connecticut, particularly of the northwest section of the state where the old Salisbury iron mine and an early foundry are located.

After Mr. Hughes' talk, motion pictures were shown which traced the process of aluminum mining and fabrication, from the earth to the finished product. These were presented through the courtesy of the Aluminum Co. of America.

About Authors

(*Concluded from page 17*)

● David R. Merrill *(M '36) has been affiliated with the Union Oil Co. of California since 1921. Prior to his appointment as research manager in 1930 he had been assistant manager of research and development, and research supervisor. Dr. Merrill holds various patents on catalytic processes, solvent extraction, and other petroleum refining processes and products. After receiving his A.B., B.S., and M.S. degrees from the University of California in 1917 and 1918, he went to Harvard for his Ph.D. He was a special student in chemical engineering and research associate, research laboratory of applied chemistry at M.I.T. during 1920 and 1921. His schooling was interrupted by nine months in the Chemical Warfare Service as a private and second lieutenant during 1918-1919. Dr. Merrill has written many technical articles on lubrication and petroleum refining.*

● C. C. Moore, Jr., *left Worcester Polytechnic Institute, where he was in the class of '18, to join the United States Army Air Service as second lieutenant in 1917. Following the War, he finished his engineering courses at M.I.T., receiving his B.S. in 1920. After working with the Goodyear Tire & Rubber Co. for one year, Mr. Moore began his employment with the Union Oil Co. of Calif., where he is research department supervisor in charge of engine laboratory. He is co-author of several technical articles on diesel fuels and lubricating oils.*

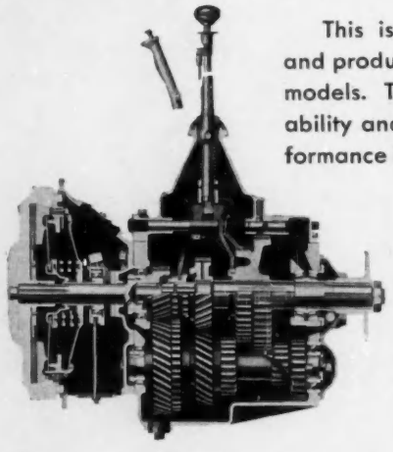
● W. H. Mussey's *principal interest in railroad work is the development of lightweight cars, both passenger and freight. He has developed a technique of testing railroad equipment for static, live load, and impact so as to assure the integrity of these structures. He graduated from Lehigh University as an electrical engineer in 1896, and since then has been continuously associated with railroading with the exception of a short period when he was managing director of the Colorado Vanadium Co. His first job was with the Baldwin Locomotive Works. Next he was chief draftsman, and later acting mechanical engineer, with the Lehigh Valley R.R. During the period of its electrification, he was assistant engineer in charge of engineering of the Long Island R.R. In 1921 he went with the Pullman-Standard Car Mfg. Co. as assistant chief engineer and later became chief mechanical engineer. His present title is engineer of research.*

● G. H. Parker *graduated from the Michigan College of Mines in 1924. After spending three years as engineer for the Brule Mining Co., he taught mathematics at Lombard College. He later spent two years at Purdue on the teaching staff of the department of practical mechanics and did graduate work in mechanical engineering which culminated in his being awarded the degree of M.S.M.E. For the next five years he was engaged in design, stress analysis, and development work for the Consolidated Aircraft Corp., which was then located in Buffalo. After leaving Consolidated, he joined the structures department of Chrysler Corp., engineering division, and since has been investigating problems in connection with car ride, noise and vibration.*

● Wallace E. Zierer *(M '27), who is in charge of road-performance testing in the engineering division of Chrysler Corp., has concentrated his efforts largely on improvement in fuel economy, particularly with respect to cars in fleet operation. He received his engineering education at Purdue University. After three years in the experimental department of Marmon Motor Car Co., he returned to Purdue as research assistant in the Engineering Experiment Station of the University. For the past nine years Mr. Zierer has been a member of the Chrysler engineering staff.*

20,000 years experience
IN THE AUTOMOTIVE INDUSTRY

● Actually the Spicer personnel offers many more than 20,000 man-years of engineering and production of automotive parts.



This is the experience that developed and produces the Spicer equipment for 1939 models. The increased efficiency, dependability and economy of motor vehicle performance is a reflection of the like improvement in Spicer products. Since the earliest days of the industry, every year Spicer has developed and manufactured equipment to meet the demand for better performance.

Spicer equipped vehicles prove the value of experience and skill in manufacture. Users find dependable performance and remarkable freedom from repairs proof of how well Spicer experience serves the industry.

Brown-Lipe Helical Gear Transmissions, with 3, 4, 5 or 8 speeds forward, are available for any type of commercial vehicle... Above is illustrated the Brown-Lipe Model 5341 4-Speed Helical Gear Transmission.

Spicer Manufacturing Corporation, Toledo, Ohio

BROWN-LIPE	SALISBURY	SPICER	PARISH
CLUTCHES and TRANSMISSIONS	FRONT and REAR AXLES	UNIVERSAL JOINTS	FRAMES READING, PA.